S/M No. : DSC140BEF0

Service Manual
Color Television

CHASSIS : SC-140
Model : DSC-3210E

DAEWOO ELECTRONICS CO., LTD

http : //svc.dwe.co.kr Jul. 2002

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1- Main Features

1-1 Specifications

TV standard	PAL - SECAM B/G D/K, PAL I/I, SECAM L/LÕ
Sound system	NICAM B/G, I, D/K, L, FM 2Carrier B/G, D/K
Power consumption	32" 16:9 FST : 95W approx. 32" 16:9 Real Flat : 95W approx.
Sound Output Power	32" : 7W x2 (at 1KHz, 60% mod, 10% THD)
Speaker	32" : 12W 8 ohm x2
Teletext system	10 pages memory FASTEXT (FLOF or TOP)
Aerial input	75 ohm unbalanced
Channel coverage	Off-air channels, S-cable channels and hyperband
Tuning system	frequency synthesiser tuning system
Visual screen	32" : 76Cm
Channel indication	On Screen Display
program Selection	100 programmes
Aux. terminal	EURO-SCART 1 : Audio / Video In and Out, R/G/B In, Slow and Fast switching. EURO-SCART 2 : Audio / Video In and Out, SVHS In. Monitor Out(option) AV3 : Audio-Video Jack on front of cabinet. Headphone jack (3.5 mm) on front of cabinet SVHS3 (option) : Jack on front of cabinet - sound input common with AV3.
Remote Control Unit	R-46G22

Specification Matrix

Chassis Name	SC-140
VCT Version	3834
Software Version	A
Remote Control	R46G22
PCB Serial Number	4859809424
Tube	16:9 FST / 16:9 Real Flat
SVHS 3	✓
"picture Improvements, Comb Filter, Horizontal Scaler"	✓
Teletext Split Screen	✓
Formats Available in Video Mode	Atuo / 4:3 / 14:9 / Zoom 14:9/ Zoom 16:9 / Full Screen
AV2 Monitor Output	✓
MSP Version (Option)	3410
Sound Dffects	Off / Spatial
Graphic Equalizer	✓
AV3 Audio Input	Dedicated
Teletext Page Memory	10 Page
Top Teletext	Available : Selectable in factory / Service mode by option bits
Flof Teletext	Available : Selectable in factory / Service mode by option bits
Text Character Support	"Pan-European Latin, Cyrillic, Greek"
OSD Languages	"English, French, German, Italian, Spanish, Dutch, Finnish, Norwegian, Swedish, Greek, Polish, Czech, Slovakian, Romanian, Russian."
Tuner Options	"Philips, Alps, Partsnic"

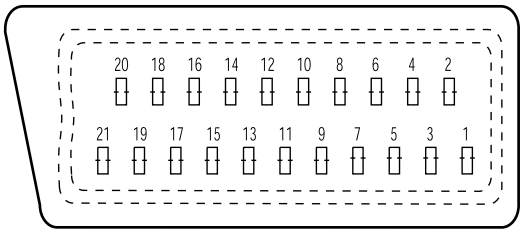
21 Pin EURO-SCART 1 :

Pin	Signal Description	Matching value
1	Audio Output Right	0.5 Vrms, Impedance < 1kΩ , (RF 54% Mod)
2	Audio Input Right	0.5 Vrms, Impedance > 10 kΩ
3	Audio Output Left	0.5 Vrms, Impedance < 1kΩ , (RF 54% Mod)
4	Audio Earth	
5	Blue Earth	
6	Audio Input Left	0.5 Vrms, Impedance > 10 kΩ
7	Blue Input	0.7 Vpp ±0.1V, Impedance 75 Ω
8	Slow Switching	TV : 0 to 2V, AV 16/9 : 4.5 to 7V, AV 4/3 : 9.5 to 12V , Impedance > 10 kΩ
9	Green Earth	
10	N.C.	
11	Green Input	0.7 Vpp ± 0.1V, Impedance 75 Ω
12	N.C.	
13	Red Earth	
14	Blanking Earth	
15	Red Input	0.7 Vpp ± 0.1V, Impedance 75 Ω
16	Fast Switching	0 to 0.4V : Logic “0”, 1 to 3V : Logic “1”, Impedance 75 Ω
17	Video Out Earth	
18	Video In Earth	
19	Video Output	1 Vpp ± 3dB, Impedance 75 Ω
20	Video Input	1 Vpp ± 3dB, Impedance 75 Ω
21	Common Earth	

21 Pin EURO-SCART 2 :

Pin	Signal Description	Matching value
1	Audio Output Right	0.5 Vrms, Impedance < 1 kΩ , (RF 54% Mod) - Not available for cp885
2	Audio Input Right	0.5 Vrms, Impedance > 10 kΩ
3	Audio Output Left	0.5 Vrms, Impedance < 1 kΩ , (RF 54% Mod) - Not available for cp885
4	Audio Earth	
5	Earth	
6	Audio Input Left	0.5 Vrms, Impedance > 10 kΩ
7	N.C.	
8	Slow Switching	TV: 0 to 2V, AV 16:9: 4.5V to 7V, AV 4:3: 9.5 to 12V
9	N.C.	
10	N.C.	
11	N.C.	
12	N.C.	
13	Earth	
14	Earth	
15	Chroma Input	±3dB for a luminance signal of 1 Vpp
16	N.C.	
17	Earth	
18	Video In Earth	

19	Video Output	1 Vpp ± 3dB, Impedance 75Ω (Monitor output) - Not available for cp885
20	Video Input, Y In.	1 Vpp ± 3dB, Impedance 75Ω
21	Common Earth	



1-2 Channel table

FREQUENCY TABLE

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C01	46.25	-	47.75	49.75
C02	48.25	55.75 (L')	53.75	59.25
C03	55.25	60.5 (L')	61.75	77.25
C04	62.25	63.75 (L')	175.25	85.25
C05	175.25	176.00	183.25	93.25
C06	182.25	184.00	191.25	175.25
C07	189.25	192.00	199.25	183.25
C08	196.25	200.00	207.25	191.25
C09	203.25	208.00	215.25	199.25
C10	210.25	216.00	223.25	207.25
C11	217.25	189.25 (LUX)	231.25	215.25
C12	224.25	69.25 (L')	239.25	223.25
C13	53.75	76.25 (L')	247.25	-
C14	-	83.25 (L')	49.75	-
C15	82.25	90.25	57.75	-
C16	-	97.25	65.75	-
C17	183.75	-	77.75	-
C18	192.25	-	85.75	-
C19	201.25	-	-	-
C20	-	-	-	-
C21	471.25	471.25	471.25	471.25
C22	479.25	479.25	479.25	479.25
C23	487.25	487.25	487.25	487.25
C24	495.25	495.25	495.25	495.25
C25	503.25	503.25	503.25	503.25
C26	511.25	511.25	511.25	511.25
C27	519.25	519.25	519.25	519.25
C28	527.25	527.25	527.25	527.25
C29	535.25	535.25	535.25	535.25
C30	543.25	543.25	543.25	543.25
C31	551.25	551.25	551.25	551.25
C32	559.25	559.25	559.25	559.25
C33	567.25	567.25	567.25	567.25
C34	575.25	575.25	575.25	575.25
C35	583.25	583.25	583.25	583.25
C36	591.25	591.25	591.25	591.25
C37	599.25	599.25	599.25	599.25
C38	607.25	607.25	607.25	607.25
C39	615.25	615.25	615.25	615.25
C40	623.25	623.25	623.25	623.25
C41	631.25	631.25	631.25	631.25

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
C42	639.25	639.25	639.25	639.25
C43	647.25	647.25	647.25	647.25
C44	655.25	655.25	655.25	655.25
C45	663.25	663.25	663.25	663.25
C46	671.25	671.25	671.25	671.25
C47	679.25	679.25	679.25	679.25
C48	687.25	687.25	687.25	687.25
C49	695.25	695.25	695.25	695.25
C50	703.25	703.25	703.25	703.25
C51	711.25	711.25	711.25	711.25
C52	719.25	719.25	719.25	719.25
C53	727.25	727.25	727.25	727.25
C54	735.25	735.25	735.25	735.25
C55	743.25	743.25	743.25	743.25
C56	751.25	751.25	751.25	751.25
C57	759.25	759.25	759.25	759.25
C58	767.25	767.25	767.25	767.25
C59	775.25	775.25	775.25	775.25
C60	783.25	783.25	783.25	783.25
C61	791.25	791.25	791.25	791.25
C62	799.25	799.25	799.25	799.25
C63	807.25	807.25	807.25	807.25
C64	815.25	815.25	815.25	815.25
C65	823.25	823.25	823.25	823.25
C66	831.25	831.25	831.25	831.25
C67	839.25	839.25	839.25	839.25
C68	847.25	847.25	847.25	847.25
C69	855.25	855.25	855.25	855.25
C70	863.25	863.25	863.25	863.25
C71	69.25	-	-	-
C72	76.25	-	-	-
C73	83.25	-	-	-
C74	90.25	-	-	-
C75	97.25	-	-	-
C76	59.25	-	-	-
C77	93.25	-	-	-
S01	105.25	104.75	103.25	105.25
S02	112.25	116.75	111.25	112.25
S03	119.25	128.75	119.25	119.25
S04	126.25	140.75	127.25	126.25
S05	133.25	152.75	135.25	133.25
S06	140.25	164.75	143.25	140.25
S07	147.25	176.75	151.25	147.25
S08	154.25	188.75	159.25	154.25
S09	161.25	200.75	167.25	161.25

CH	EUROPE CCIR	FRANCE	GB(IRELAND)	EAST OIRT
S10	168.25	212.75	-	168.25
S11	231.25	224.75	-	231.25
S12	238.25	236.75	-	238.25
S13	245.25	248.75	255.25	245.25
S14	252.25	260.75	263.25	252.25
S15	259.25	272.75	271.25	259.25
S16	266.25	284.75	279.25	266.25
S17	273.25	296.75	287.25	273.25
S18	280.25	136.00	295.25	280.25
S19	287.25	160.00	303.25	287.25
S20	294.25	-	-	294.25
S21	303.25	303.25	-	303.25
S22	311.25	311.25	311.25	311.25
S23	319.25	319.25	319.25	319.25
S24	327.25	327.25	327.25	327.25
S25	335.25	335.25	335.25	335.25
S26	343.25	343.25	343.25	343.25
S27	351.25	351.25	351.25	351.25
S28	359.25	359.25	359.25	359.25
S29	367.25	367.25	367.25	367.25
S30	375.25	375.25	375.25	375.25
S31	383.25	383.25	383.25	383.25
S32	391.25	391.25	391.25	391.25
S33	399.25	399.25	399.25	399.25
S34	407.25	407.25	407.25	407.25
S35	415.25	415.25	415.25	415.25
S36	423.25	423.25	423.25	423.25
S37	431.25	431.25	431.25	431.25
S38	439.25	439.25	439.25	439.25
S39	447.25	447.25	447.25	447.25
S40	455.25	455.25	455.25	455.25
S41	463.25	463.25	463.25	463.25

1-3 ATSS sorting method

The TV set sweeps all the TV bands from beginning of VHF to end of UHF. The TV controlling software for each program checks if a VPS CNI code is transmitted (this system exists for German, Swiss and Austrian transmissions). If no VPS CNI code is found, then the system check if a CNI code is transmitted as part of the teletext transmission (Packet 8/30 format 1). If such a code (VPS or teletext) is found and if this code is in the ATSS list, the program is automatically named.
If the transmission does not have VPS CNI, and no teletext service is available, then there is no possibility of the program being automatically named.
The programs found are then sorted in 4 groups :

Group I : It contains all the programs from the selected country and named by the TV controlling software. Within this group the sorting order is fixed by the ATSS list.
Group II : It contains all the programs with a strong signal strength which are not listed in group I.
Group III : It contains all the programs with a weak signal strength which are not listed in group I.
Group IV : If two or more programs with the same code are found, only the strongest (or if they have the same level the one with the lowest frequency) is listed in group I, II or III. The others are listed in group IV.

Program number	Group	Skip
1	Group I	
2		
...		
n		
n+1	Group II	
...		
m		
m+1	Group III	
...		
p		
p+1	Group IV	✓
...		
q		
q+1	not used	✓
....		
99		
0		

Program number	Group	Skip
1	Group II	
...		
m		
m+1	Group III	
...		
p		
p+1	Group IV	✓
...		
q		
q+1	not used	✓
....		
99		
0		

Special case : **Country selection = Others**

Special case : **France**
Note : If two programs with the same name but a different code are found these two programs are listed in group I, II or III (e.g. Regional program SW3 in Germany).

The sor ting order within group II, III, and IV is based on the channel frequency. The Pro gram with the lo west frequency is allocated the first rank in its group, and so f orth until the last program of the group which has the highest fr equency.

Special case : **France**
If France is selected, the TV controlling softw are f irst swe eps all TV bands with Fr ance system selected (positi ve video modulation) and the a second time with Europe system selected (nega tive video modulation).

Special case : **Switzerland**
If Switzerland is selected the TV controlling softw are f irst s weeps all TV bands with Eur ope system selected (ne ga tive video modulation) and then a second time with France system selected (positive video modulation).

Special case : **GB**
Note for sa tellite recei ver users : Before starting ATSS tur n On your satellite r ecei ver and tune " SKY NEWS ".
If GB is selected the TV controlling software seeks for programs only in UHF (C21 to C70).
The sorting order is :
1 - BBC1
2 - BBC2
3 - ITV
4 - CH4
5 - CH5
6 - NEWS

If two or more " identical" pr ogr ams (same name but different code e.g. BBC1 and BBC1 Scotland) are found the f ollowing pro grams in the list will be shifted up. (1 - BBC1, 2 - BBC1, 3 - BBC2, 4 -ITV, 5 - CH4, 6 - CH5, 7 - NEWS, ..)

If one of the progr am abo ve is not f ound, the associated program number remains empty
(freq.=467.25 Mhz - Skip selected - no name - system=GB).
example A : 1 - BBC1, 2 - BBC2, 3 - ITV , 4 - ----, 5 - CH5, 6 - NEW S , ...
example B (if 2 BBC1 found) : 1 - BBC1, 2 - BBC1, 3 - BBC2, 4 - IT V, 5 - -----, 6 - CH5, 7 -NEWS, ...

2. Safety instruction

WARNING : Only Competent Service personnel may carry out work involving the testing or repair of this equipment.

X-RAY RADIATION PRECAUTION

1. Excessive high voltage can produce petentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 26KV(21" - 29") at max beam current. The high voltage must not, under any circumstances, exceed 29.5KV (21" - 25") or 30KV (28" - 29"). Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY Radiation in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

SAFETY PRECAUTION

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back board removed involves a shock hazard from the receiver.
   1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
   2) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a gigh wattage resistor (metal oxide film resistor) in the circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 220~240 volts, 50Hz. NEVER connect to DC supply or any other power or frequency.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this equipment have special safety-related characteristics.
These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY Radiation.

3 - Alignment instructions

3-1 Microcontroller configuration : Service mode
To switch the TV set into service mode please see instruction below.

1 - Select pr. number 91
2 - Adjust sharpness to minimum and exit all menu.
3 - Quickly press the key sequence : **RED - GREEN - menu**

To software version is displayed beside the word Service, e.g. " SERVICE V1.00A".

To exit SERVICE menu press **menu** key or **Std By** key.

3-2 Service mode navigation
Pr Up / Down remote keys : cycle through the service items available.
Vol- / + remote keys : Decrement / Increment the values within range.
0~7 digit keys : Toggle bits 0~7 in option byte

Order	Item	Default settingh for wp 895
1	PARABOLA	+140
2	HOR WIDTH	-1100
3	CORNER	-80
4	HOR.PARAL	-1
5	V.LINEAR	-2
6	EW TRAPEZ	-12
7	S CORRECT	-15
8	H BOW	+100
9	VERT SIZE	+145
10	VERT CENT	+3939
11	RED GAIN	+92
12	GRN GAIN	+87
13	BLUE GAIN	+95
14	RED BIAS	+128
15	GRN BIAS	+128
16	HOR CEN	98
17	AGC LEVEL	-
18	G2-SCREEN	-
19	AFT	-
20	OPTION	-
21	MAXV OL	Not used

3-3 Microcontroller configuration : Option bits
These option bits are available from Service mode. First find the OPTION control, and then use keys 0...7 on the remote keypad to control bits 0 to 7 respectively. The table below shows the options a vailable ;

	B7	B6	B5	B4	B3	B2	B1	B0
1	TOP text off	FASTEXT /FLOF off	TUBE 4:3	X		SVHS3 disable	Tuner options 00=Philips 01=ALPS 10=Philips (AGC intern) 11=Not used.	
0	TOP text on	FASTEXT (FLOF) on	TUBE 16:9	X	X	SVHS3 enable		

Set all the unused bits, markde 'X', to be 0 for future compatibility.

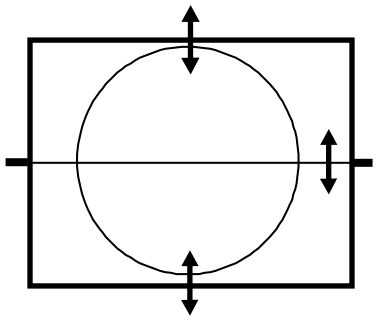
3-4 TV set Alignment
3-4-1- Local oscillator alignment
Tune a colour bar pattern. The Frequency of the signal carrier must be accurate (Max +/- 10khz deviation fron the nominal channel frequency).
Find "AFT" item in service mode.
Adjust the coil L150 to bring the cursor to central position : 32.

3-4-2- G2 alignment
- Tune a colour bar pattern.
- Find the "G2 - SCREEN" item in service mode.
- Adjust screen volume (on FBT) to bring the cursor to central position : 32.

3-4-3- White balance
- Select a dark picture and adjust RED BIAS and GRN BIAS to the desired colour temperature.
- Select a bright picture and adjust REC, GRN and BLUE GAIN to the desired dolour temperature.

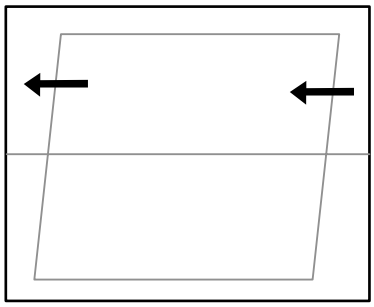
3-4-4- Forcus
Adjust the Forcus volume (on FBT) to have the best resolution on screen.

3-4-5- Vertical geometry
Adjust V.LINEAR (linearity), S CORRECT (S. Corrention), VERT SIZE (Vertical amplitude), VERT CENT (vertical centing) to compensate for vertical distortion.

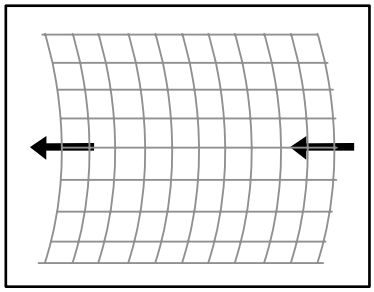


3-4-6- Horizontal picture centring
Adjust HOR CEN(Horizontal center) to have the picture in the center of the screen.

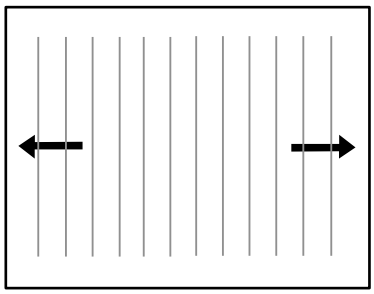
3-4-7- Eau/West comection
Adjust the PARABOLA, HOR WIDTH, CORNER, HOR PARAL, EW TRAPEZ, H BOW, to compensate for geometrical distorrin,



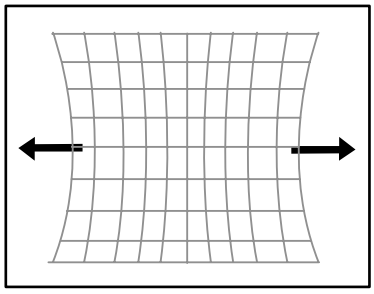
HOR PARAL



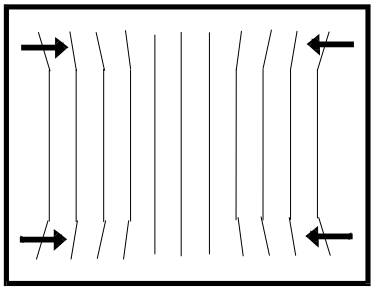
H BOW



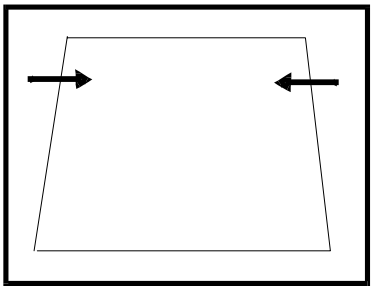
HOR WIDTH For HOR WIDTH, adjust for 91% overscan.



PARAROLA



CORNER



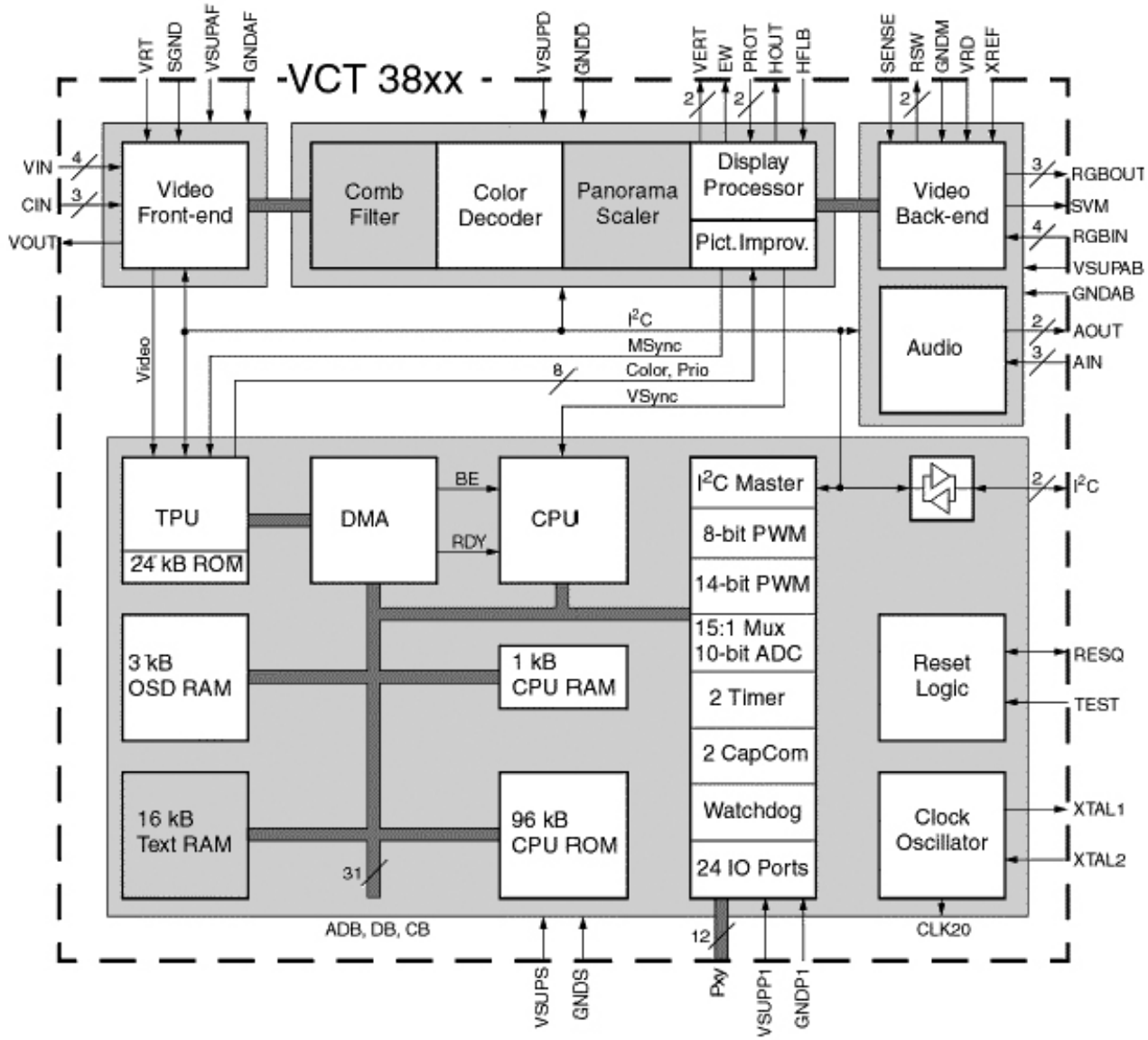
EW TRAPEZ

3-4-8- AGC
- Adjust the antenna signal level at 70 dBμV± 2
- Tune a colour bar pattern.
- Find the "AGC" item in service mode.
- Adjust AGC volume (RB10) to bring the cursor to central position : 32.

4 - IC description

4-1 VCT383XA TV signal processor - Teletext decoder with embedded 8 bit μ- Controller.

4-1-1- Block diagram of the VCT



Four composite video inputs, two S-VHS inputs
Analogue YC r C b input
Composite video monitor
Multistandard colour decoder (1 crystal)
Multistandard sync decoder
Black-line detector
Adaptive 2H comb filter Y/C separator

Horizontal scaling (0.25 to 4)
Panoramavision
Black-level expander
Dynamic peaking
Soft limiter (gamma corection)
Colour transient improvement
Programmable RGB matrix
Analogue RGB/Fastblank input
Half-contrast switch
Picture frame generator
Scan velocity modulation output
High-performance H/V deflection
Angle and bow correction
Separate ADC for tube measurements
EHT compensation

4-1-3- μ-Controller
8-bit, 10-Mhz CPU (65C02)
96 kB program ROM on chip
1 kB program RAM on chip
memory banking
16-input, 16-level interrupt controller
patch module for 10 ROM locations
two 16-bit reloadable timers
capture compare module
watchdog timer
14-bit PWM for voltage synthesis
Four 8-bit PWMs
10-bit ADC with 15:1 input MUX
I2C bus master interface
24 programmable I/O ports
80C51 μ-controller core standard instruction set and timing
1 μ s machine cycle
32-128Kx8-bit late programmed ROM
3-12Kx8-bit Auxiliary RAM (shared with Display and Acquisition)
Interrupt controller for individual enable/disable with two level priority
Two 16-bit Timer/Counter registers
WatchDog timer
Auxiliary RAM page pointer
16-bit Data pointer
IDLE and Power Down (PD) mode
14 bits PWM for Voltage Synthesis Tuning
8-bit A/D converter
4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

4-1-4- Teletext Features
Four programmable video inputs
Adapt ive data slicer
Signal quality detection
WST, PDC, VPS, and WSS acquisition

High-level command language
FLOF (Fastext), and TOP support
10 pages memory on chip (10kB)

4-1-5- Display OSD Features
3kB OSD RAM on chip
WST level 1.5 compliant
WST level 2 parallel attributes
32 foreground/background colours
programmable colour look-up table
1024 mask programmable characters
17 national languages
(Latin, Cyrillic and Greek caracter sets)
Character matrix 10x10
4-color mode for user font

4-1-6- Audio Features
Three mono inputs
Two mono outputs
Programmable channel select
Volume control for one mono channel

4-1-7- General Features
Submicron CMOS technology
Low-power standby mode
Single 20.25 MHz crystal
64-pin PSDIP package

4-1-8- Data Capture
The Video Front End section takes in the analogue Composite Video and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.

The extraction of the data is performed in the digital domain. The first stage is to select and convert the analogue CVBS signal into a digital form. This is done using 8 bit ADC sampling at 20.25 Mhz.

The digital data services transmitted in the VBI are selected and acquired separately form the video part. This is done by the use of an adaptive data slicer. The following data types can be extracted : 625 line World System Teletext (WST), VPS, WSS. The data is acquired and decoded by the teletext decoder (TPU), then stored in an SRAM lnterface.

4-1-9- Data Capture Features
Video Signal Quality detector
Data Capture for 625 line WST
Data Capture for VPS data (PDC system A)
Data Capture for Wide Screen Signalling (WSS) bit decoding
Real-time capture and decoding for WST Teletext in Hardware, to enable optimised microprocessor throughput
10 page memory stored On-Chip

• Inventory of transmitted Teletext pages stored in the Page Table
Signal quality detector for WST data
Comprehensive Teletext language coverage
Full Field Vertical Blanking Interval (VBI) data capture of WST data

4-1-10- TV processor version and µController capacity

IC version	VCT 3832A	VCT 3834A
8 bit µ-controller	√	√
ROM size	96k	96k
RAM size	1k	1k
PAL decoder	√	√
SECAM decoder	√	√
NTSC decoder	√	√
Picture improvement	√	√
Teletext page memory	10 pages	10 pages
Adaptive Comb filter	X	√
Panorama Scaler		√

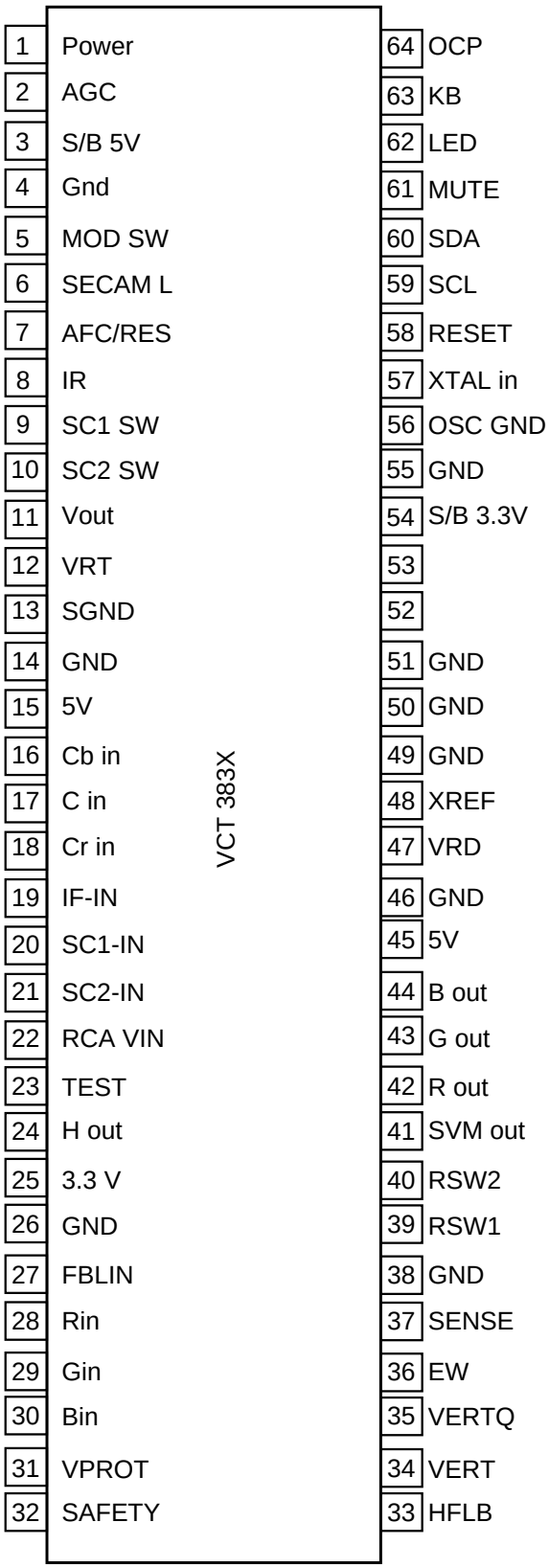
4-1-11- IC marking and version

Chassis	IC marking	OSD languages	ATSS countries	Text
SC-140	VCT3834A	English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek, Polish, Hungarian, Czech, Slovakian, Romanian, Russian.	GB, France, Germany, Italy, Belgium, Spain, Austria, Poland, Switzerland, Denmark, Finland, Netherlands, Norway, Sweden, Ireland, Hungary, Czech Republic, Others	Pan-European Latin. Cyrillic, Greek.

4-1-12- Pinning

PSDIP 64-pin	Pin Name	Type	Short Description
1	Power	OUT	High = SMPS ON, Low = SMPS in stand by mode.
2	AGC	IN	For service only, tuner AGC, TOP alignment.
3	VSUPP1	SUPPLY	Supply Voltage, Port (pin 1, 2, 5, 6, 7, 8, 9, 10, 61, 62, 63, 64).
4	GNDP1	SUPPLY	Ground, Port.
5	MOD_SW	OUT	High = Negative modulation, Low = Positive modulation (L/L').
6	SECAM L/L'	OUT	High = L' L ow = L.
7	AFC	IN	
8	IR	IN	
9	SC1.SW	IN	
10	SC2.SW	IN	
11	VOUT	OUT	Analog Video Output
12	VRT	IN	Reference Voltage Top, Video ADC
13	SGND	IN	Signal Ground for Analog Input

PSDIP 64-pin	Pin Name	Type	Short Description
14	GNDAF	SUPPLY	Ground, Analog Front-end
15	VSUPAF	SUPPLY	Supply Voltage, Analog Front-end
16	CBIN	IN	Analog Component Cb Input
17	CIN1	IN	Analog Chroma 1 Input
18	CIN2/CRIN	IN	Analog Chroma 2 Input / Analog Component Cr Input
19	VIN1	IN	Analog Video 1 Input
20	VIN2	IN	Analog Video 2 Input
21	VIN3	IN	Analog Video 3 Input
22	VIN4	IN	Analog Video 4 Input
23	TEST	IN	Test Pin, Reserved For Test
24	HOUT	OUT	Horizontal Drive Output
25	VSUPD	SUPPLY	Supply Voltage, Digital Circuitry
26	GNDD	SUPPLY	Ground, Digital Circuitry
27	FBLIN	IN	Fast Blank Input
28	RIN	IN	Analog Red Input
29	GIN	IN	Analog Green Input
30	BIN	IN	Analog Blue Input
31	VPROT	IN	Vertical Protection Input
32	SAFETY	IN	Safety Input
33	HFLB	IN	Horizontal Flyback Input
34	VERTQ/ INTLC	OUT	Differential Vertical Sawtooth Output Interlace Control Output
35	VERT	OUT	Differential Vertical Sawtooth Output
36	EW	OUT	Vertical Parabola Output
37	SENSE	IN	Sense ADC Input
38	GNDM	SUPPLY	Ground, MADC Input
39	RSW1	OUT	Range Switch1 for Measurement ADC
40	RSW2	OUT	Range Switch2 for Measurement ADC
41	SVMOUT	OUT	Scan Velocity Modulation Output
42	ROUT	OUT	Analog Red Output
43	GOUT	OUT	Analog Green Output
44	BOUT	OUT	Analog Blue Output
45	VSUPAB	SUPPLY	Supply Voltage, Analog Back-end
46	GNDAB	SUPPLY	Ground, Analog Back-end
47	VRD	IN	DAC Reference
48	XREF	IN	Reference Input for RGB DACs
49	AIN3	IN	Analog Audio 3 Input
50	AIN2	IN	Analog Audio 2 Input
51	AIN1	IN	Analog Audio 1 Input
52	AOUT2	OUT	Analog Audio 2 Output
53	AOUT1	OUT	Analog Audio 1 Output
54	VSUPS	SUPPLY	Supply Voltage, Standby
55	GNDS	SUPPLY	Ground, Standby
56	XTAL1	IN	Analog Crystal Input
57	XTAL2	OUT	Analog Crystal Output
58	RESQ	IN/OUT	Reset Input/Output, Active Low
59	SCL	IN/OUT	I 2 C Bus Clock
60	SDA	IN/OUT	I 2 C Bus Data
61	Mute	OUT	High = Mute active
62	LED	OUT	High = Green, Low = Red
63	KB	IN	Local keyboard ADC input
64	OCP	IN	Over Current Protection input


1 Power
2 AGC
3 S/B 5V
4 Gnd
5 MOD SW
6 SECAM L
7 AFC/RES
8 IR
9 SC1 SW
10 SC2 SW
11 Vout
12 VRT
13 SGND
14 GND
15 5V
16 Cb in
17 C in
18 Cr in
19 IF-IN
20 SC1-IN
21 SC2-IN
22 RCA VIN
23 TEST
24 H out
25 3.3 V
26 GND
27 FBLIN
28 Rin
29 Gin
30 Bin
31 VPROT
32 SAFETY
VCT 383X
64 OCP
63 KB
62 LED
61 MUTE
60 SDA
59 SCL
58 RESET
57 XTAL in
56 OSC GND
55 GND
54 S/B 3.3V
53
52
51 GND
50 GND
49 GND
48 XREF
47 VRD
46 GND
45 5V
44 B out
43 G out
42 R out
41 SVM out
40 RSW2
39 RSW1
38 GND
37 SENSE
36 EW
35 VERTQ
34 VERT
33 HFLB

4-2 MSP341x Multistandard Sound Processor
The MSP 341x is designed as a single-chip Multistandard Sound Processor for applications in analogue and digital TV sets, video recorders, and PC cards.

The MSP3411 has all functions of MSP3410 with the addition of a virtual surround sound feature.
A Surround sound affect can be rproduced with two loudspeakers. The MSP3411 includes virtualizer algorithm "3D Panorama" which has been approved by the Dolby laboratories for compliance with the "Virtual Dolby Surround"technolo gy. In addition, the MSP3411 includes Micronas "Panorama" algorithm.

MSP 341x features :
- sound IF input
- No external filters required
- Stereo baseband input via integrated AD converters
- Two pairs of DA converters
- Two carrier FM or NICAM processing
- AVC : Automatic Volume Correction
- Bass, treble, volume processing
- Full SCART in/out matrix without restrictions
- Improved FM-identification
- Demodulator short programming
- Autodetection for terrestrial TV - sound standards
- Precise bit-error rate indication
- Automatic switching from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- Reduction of necessary controlling
- Less external components

4-2-1- Basic Features of the MSP 341x

4-2-1-1 Demodulator and NICAM Decoder Section

The MSP 341x is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM or AM mono TV sound. Alternatively, two carrier FM systems according to the German terrestrial specs can be processed with the MSP 341x.

The MSP 341x facilitates profitable multistandard capability, offering the following advantages:
- Automatic Gain Control (AGC) for analogue input: input range: 0.10 - 3 Vpp
- integrated A/D converter for sound-IF input
- all demodulation and filtering is performed on chip and is individually programmable
- easy realisation of all digital NICAM standards (B/G, I, L and D/K)
- FM-demodulation of all terrestrial standards (include identification decoding)
- no external filter hardware is required
- only one crystal clock (18.432 MHz) is necessary

- high deviation FM-mono mode (max. deviation: approx. ±360 kHz)

4-2-1-2 DSP-Section (Audio Baseband Processing)
- flexible selection of audio sources to be processed
- performance of terrestrial de-emphasise systems (FM, NICAM)
- digitally performed FM-identification decoding and de-matrixing
- digital baseband processing: volume, bass, treble
- simple controlling of volume, bass, treble

4-2-1-3 Analogue Section
- two selectable analogue pairs of audio baseband input (= two SCART inputs) input level: <2 V RMS, input impedance: >25 kΩ
- one selectable analogue mono input (i.e. AM sound): Not used in this chassis
- two high-quality A/D converters, S/N-Ratio: >85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities
- loudspeaker: one pair of four-fold oversampled D/A converters. Output level per channel: max. 1.4 VRMS output resistance: max. 5 kΩ. S/N-ratio: >85 dB at maximum volume Max. noise voltage in mute mode: < 10 µV (BW: 20 Hz... 16kHz)
- one pair of four-fold oversampled D/A converters supplying a pair of SCART-outputs. output level per channel: max. 2 V RMS, output resistance: max. 0.5 kΩ, S/N-Ratio: >85 dB (20 Hz... 16 kHz)

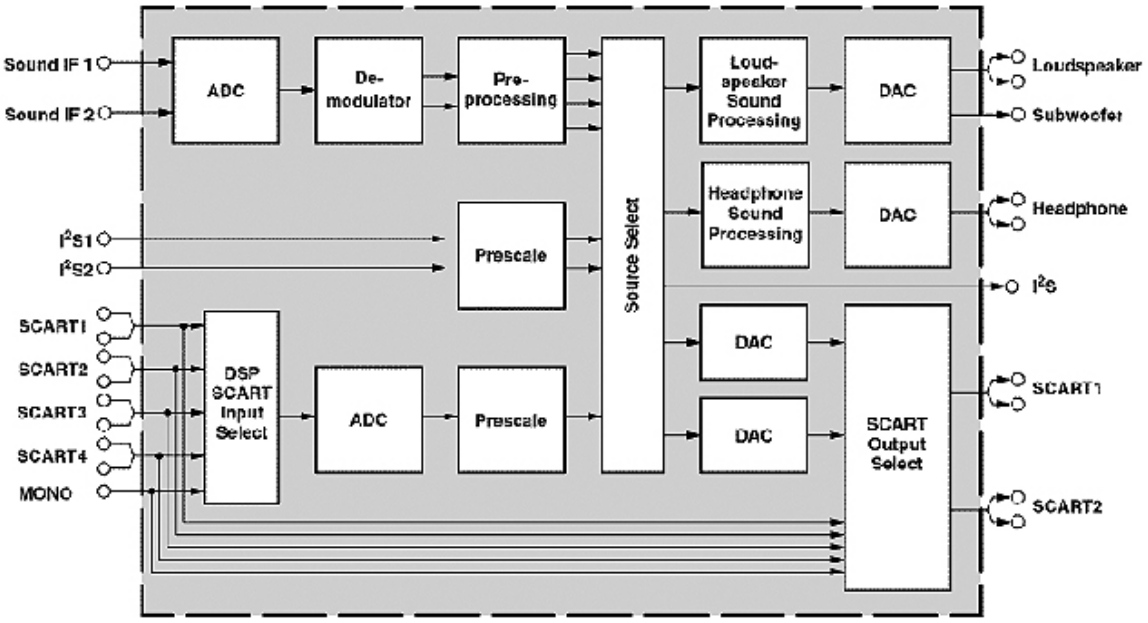
4-2-1-4 NICAM plus FM/AM-Mono

According to the British, Scandinavian, Spanish, and French TV-standards, high-quality stereo sound is transmitted digitally. The systems allow two high-quality digital sound channels to be added to the already existing FM/AM-channel. The sound coding follows the format of the so-called Near Instantaneous Companding System (NICAM 728). Transmission is performed using Differential Quadrature Phase Shift Keying (DQPSK. Table below offers an overview of the modulation parameters.)
In the case of NICAM/FM (AM) mode, there are three different audio channels available: NICAM A, NICAM B, and FM/AM-mono. NICAM A and B may belong either to a stereo or to a dual language transmission. Information about operation mode and about the quality of the NICAM signal can be read by the controlling software via the control bus. In the case of low quality (high bit error rate), the controlling software may decide to switch to the analogue FM/AM-mono sound. Alternatively, an automatic NICAM-FM/AM switching may be applied.

4-2-1-5 German 2-Carrier System (DUAL FM System)
Since September 1981, stereo and dual sound programs have been transmitted in Germany using the 2-carrier system. Sound transmission consists of the already existing first sound carrier and a second sound carrier additionally containing an identification signal. More details of this standard are given in Tables below. For D/K very similar system is used.

TV standards

TV system	Position of sound carrier (MHz)	Sound modulation	Color system	Country
B/G	5.5 / 5.7421875	FM Stereo	PAL	Germany
B/G	5.5 / 5.85	FM-Mono / NICAM	PAL	Scandinavia, Spain
L	6.5 / 5.85	AM-Mono / NICAM	SECAM-L	France
I	6.0 / 6.552	FM-Mono / NICAM	PAL	UK
D/K	6.5 / 6.2578125 D/K1 6.5 / 6.7421875 D/K2 6.5 / 5.85 D/K-NICAM	FM Stereo FM-Mono / NICAM	SECAM-East	USSR Hungary



Architecture of MSP341x

Pin connections and short description

Pin No.	Pin Name	Type	Short description
1	TP	Out	Test pin
2	NC		Not Connected
3	NC		Not Connected
4	TP	Out	Test pin
5	TP	Out	Test pin
6	ADR_SEL	In	I2C bus Address select
7	STANDBYQ	In	Standby (Low-active)
8	NC		Not Connected
9	I2C_CL	In / Out	I2C Clock
10	I2C_DA	In / Out	I2C data
11	TP	In / Out	Test pin

Pin No.	Pin Name	Type	Short description
12	TP	In / Out	Test pin
13	TP	Out	Test pin
14	NC		Not Connected
15	TP	Out	Test pin
16	TP	Out	Test pin
17	TP	Out	Test pin
18	DVSUP		Digital power supply +5V
19	DVSS		Digital Ground
20	NC		Not Connected
21	NC		Not Connected
22	NC		Not Connected
23	NC		Not Connected
24	RESETQ	In	Power-On-reset
25	NC		Not Connected
26	NC		Not Connected
27	VREF2		Reference ground 2 high voltage part
28	DACM_R	Out	Loudspeaker out Right
29	DACM_L	Out	Loudspeaker out Left
30	NC		Not Connected
31	TP	Out	Test pin
32	NC		Not Connected
33	NC		Not Connected
34	NC		Not Connected
35	VREF1		Reference ground 1 high voltage part
36	SC1_OUT_R	Out	Scart output 1, right
37	SC1_OUT_L	Out	Scart output 1, left
38	NC		Not Connected
39	AHVSUP		Analog power supply 8.0V
40	CAPL_M		Volume capacitor MAIN
41	AHVSS		Analog ground
42	AGNDC		Analog reference voltage high voltage part
43	NC		Not Connected
44	NC		Not Connected
45	NC		Not Connected
46	NC		Not Connected
47	NC		Not Connected
48	ASG2		Analog Shield Ground 2
49	SC2_IN_L	In	Scart input 2 in, left
50	SC2_IN_R	In	Scart input 2 in, right
51	ASG1		Analog Shield Ground 1
52	SC1_IN_L	In	Scart input 1 in, left
53	SC1_IN_R	In	Scart input 1 in, right
54	VREFTOP		Reference voltage IF A/D converter
55	MONO_IN	In	Mono input
56	AVSS		Analog ground
57	AVSUP		Analog power supply
58	ANA_IN1+		In IF input 1

Pin No.	Pin Name	Type	Short description
59	ANA_IN1-	In	IF common
60	NC		Not Connected
61	TESTEN	In	Test pin
62	XTAL_IN	In	Crystal oscillator
63	XTAL_OUT	Out	Crystal oscillator
64	NC		Test pin

4-3 TDA 4470-Multistandard Video-IF and Quasi Parallel Sound Processor

4-3-1- Description

The TDA 4470 is an integrated bipolar circuit for multi-standard video/sound IF (VIF/SIF) signal processing in TV/VCR and multimedia applications. The circuit processes all TV video IF signals with negative modulation (e.g., B/G standard), positive modulation (e.g., L standard) and the AM, FM/NICAM sound IF signals.

4-3-2- **Features**

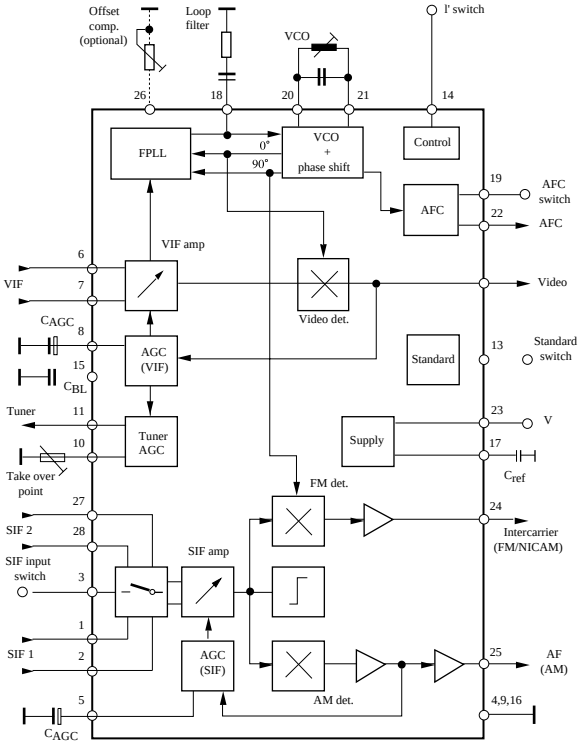
- 5V supply voltage ; low power consumption.
- Active carrier generation by FPLL principle (frequency-phase-locked-loop) for true synchronous demodulation.
- Very linear video demodulation, good pulse response and excellent intermodulation figures.
- Alignment-free AFC without external reference circuit, polarity of the AFC curve is switchable.
- VIF-AGC for negative modulated signals (peak sync. detection) and for positive modulation (peak white/black level detector).
- Tuner AGC with adjustable take over point.
- Alignment-free quasi parallel sound (QPS) mixer for FM/NICAM sound IF signals.
- Intercarrier output signal is gain controlled (necessary for digital sound processing).
- Complete alignment-free AM demodulator with gain controlled AF output.
- Separate SIF-AGC with average detection
- Two independent SIF inputs
- Parallel operation of the AM demodulator and QPS mixer (for NICAM-L stereo sound).

4-3-3- Pinning

Pin	Symbol	Function
1,2	$V_{i,SIF1}$	SIF1 input (symmetrical)
3	V_{SW}	Input selector switch
4,9,16	GND	Ground
5	V_{AGC}	SIF-AGC (time constant)
6,7	$V_{i,VIF}$	VIF input (symmetrical)
8	C_{AGC}	VIF-AGC (time constant)
10	R_{TOP}	Take Over Point, tuner AGC
11	I_{tun}	Tuner AGC output current
12	$V_{O,VID}$	Video output
13	V_{SW}	Standard switch
14	V_{SW}	L-switch
15	C_{bl}	Black level capacitor
17	C_{ref}	Internal reference voltage
18	LF	Loop Filter

Pin	Symbol	Function
19	V_{SW}	AFC switch
20, 21	V_{VCO}	VCO circuit
22	V_{AFC}	AFC output
23	V_S	Supply voltage
24	$V_{O,FM}$	Intercarrier output
25	$V_{O,AM}$	AF output-AM sound
26	R_{COMP}	Offset compensation
27, 28	$V_{i,SIF2}$	SIF2 input (symmetrical)

4-3-4 Block diagram



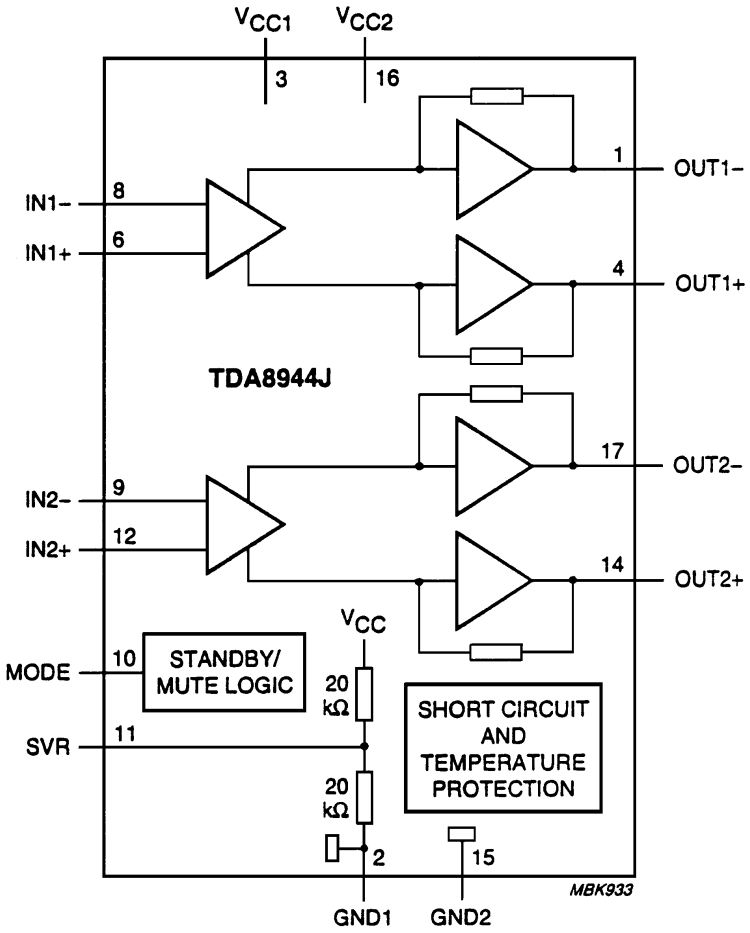
4-4 TDA894xJ Stereo Audio Amplifer

The TDA8944J(TDA 8946J) is a dual-channel audio po wer amplifier with an output power of 2 x 7W (2 X 15W) at an 8Ω load and a 12V supply. The circuit contains two Bridges Tied Load(BTL) amplifers with an all-NPN output stage and standby/mute logic. The TDA8944J comes in a 17-pin DIL power package.

4-4-1- Features
- Few external components
- Fixed gain
- Standby and mute mode
- No on/off switching pop noise
- low standby current
- High supply voltage ripple rejection
- Outputs short-circuit protected to ground, supply and across the load
- Thermally protected

Pin description

Pin	Symbol	Description
1	OUT1-	negative loudspeaker terminal 1
2	GND1	ground channel 1
3	Vcc1	supply voltage channel 1
4	OUT1+	positive loudspeaker terminal 1
5	n.c.	not connected
6	IN1+	poitive input1
7	n.c.	not connected
8	IN1-	negative input1
9	IN2-	negative input2
10	MODE	mode selection input
11	SVR	half supply voltage decoupling (ripple rejection)
12	IN2+	positive input2



Block diagram TDA8944J

4-5 TDA835xJ Vertical Amplifier

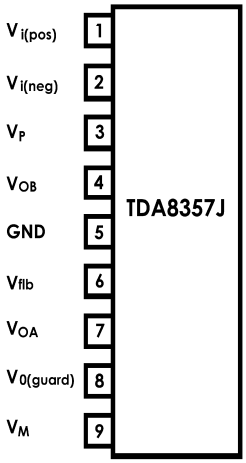
The TDA835xJ are power circuit for use in 90° and 110° colour deflection systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be DC coupled.
The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

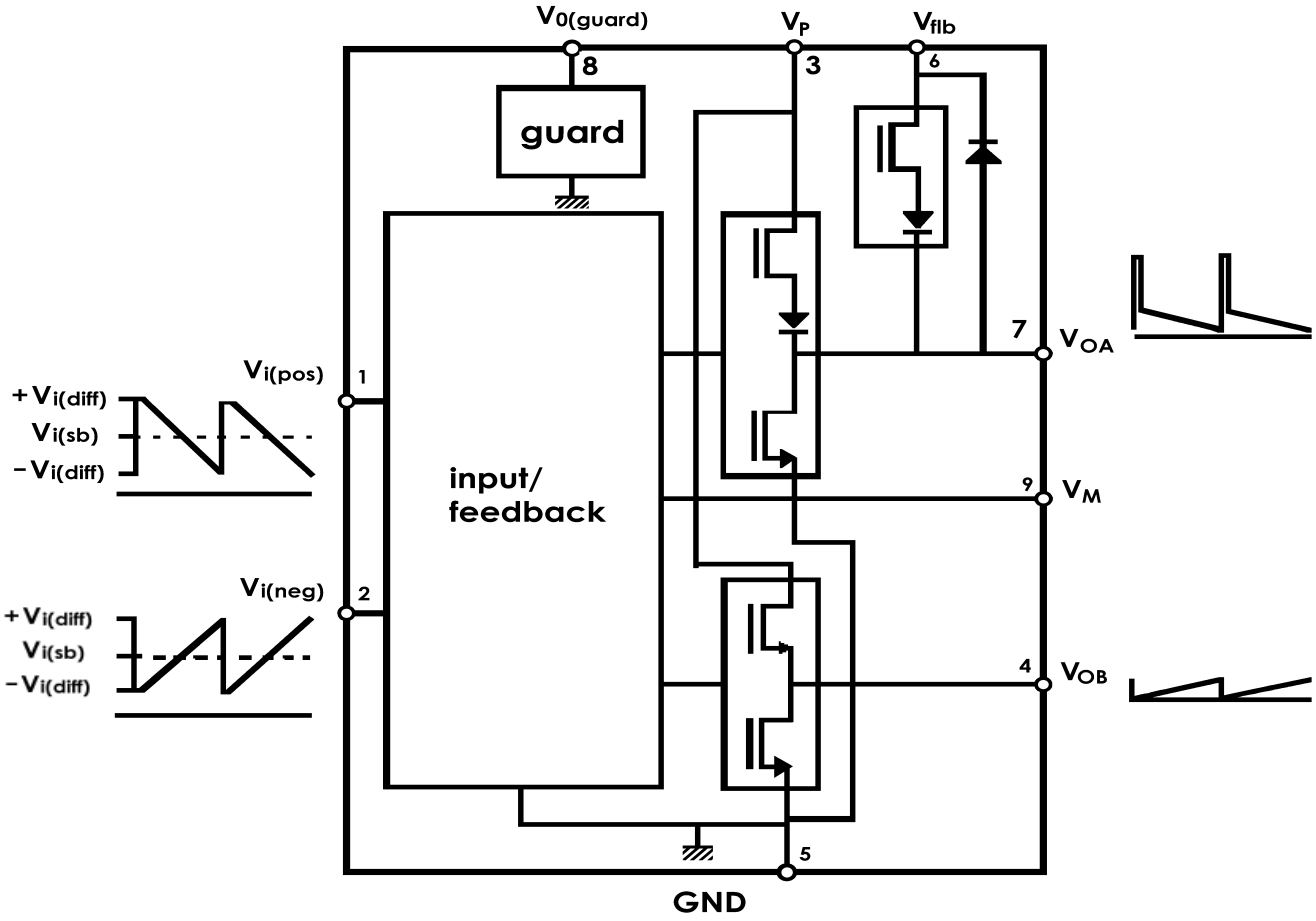
4-5-1 TDA8357J

Features :
- Few external components
- High efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs

Pinning

Pin	Symbol	Description
1	Vi(pos)	input voltage (positive)
2	Vi(neg)	input voltage (negative)
3	Vp	supply voltage
4	V_{OB}	output voltage B
5	GND	ground
6	Vflb	flyback supply voltage
7	V_{OA}	output voltage A
8	$V_{O(guard)}$	guard output voltage
9	V_M	input measuring resistor

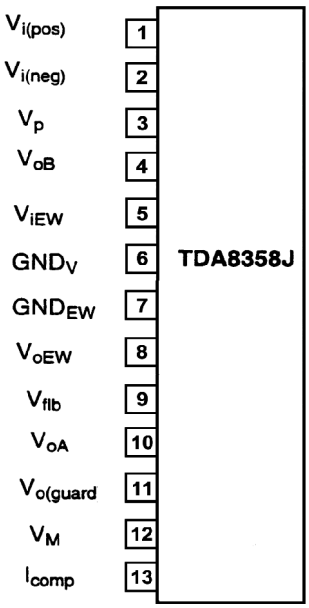


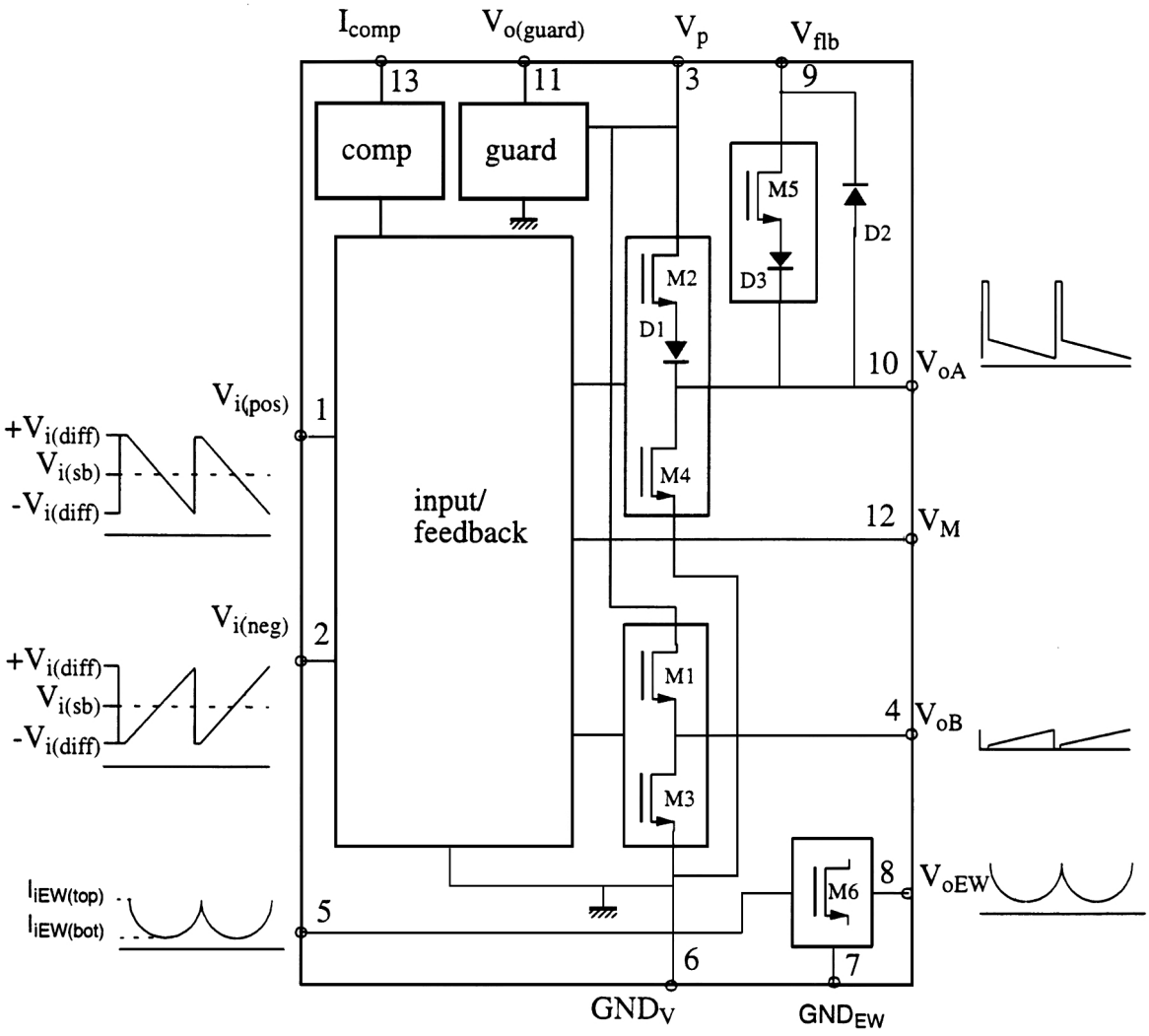


4-5-2 TDA8358J

An East-West output stage is provided that is able to sink current from the diode modulator circuit.

Features :
- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs
- East-West output stage




I_comp
V_o(guard)
V_p
V_flb
13
11
3
9
comp
guard
M5
D3
D2
M2
D1
10
V_oA
V_i(pos)
1
+V_i(diff)
V_i(sb)
-V_i(diff)
input/
feedback
M4
12
V_M
V_i(neg)
2
M1
4
V_oB
M3
M6
8
V_oEW
I_iEW(top)
I_iEW(bot)
5
6
7
GND_V
GND_EW

4-6 TDA6107Q

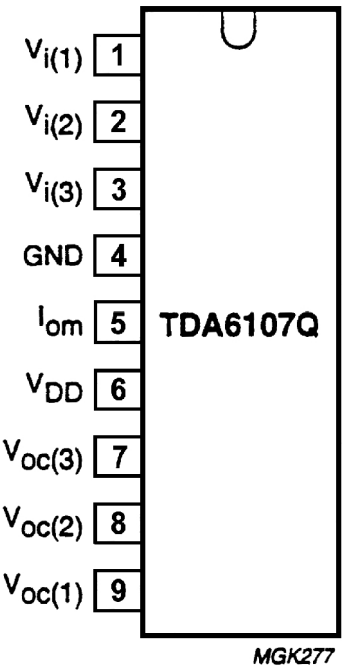
The TDA6107Q includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

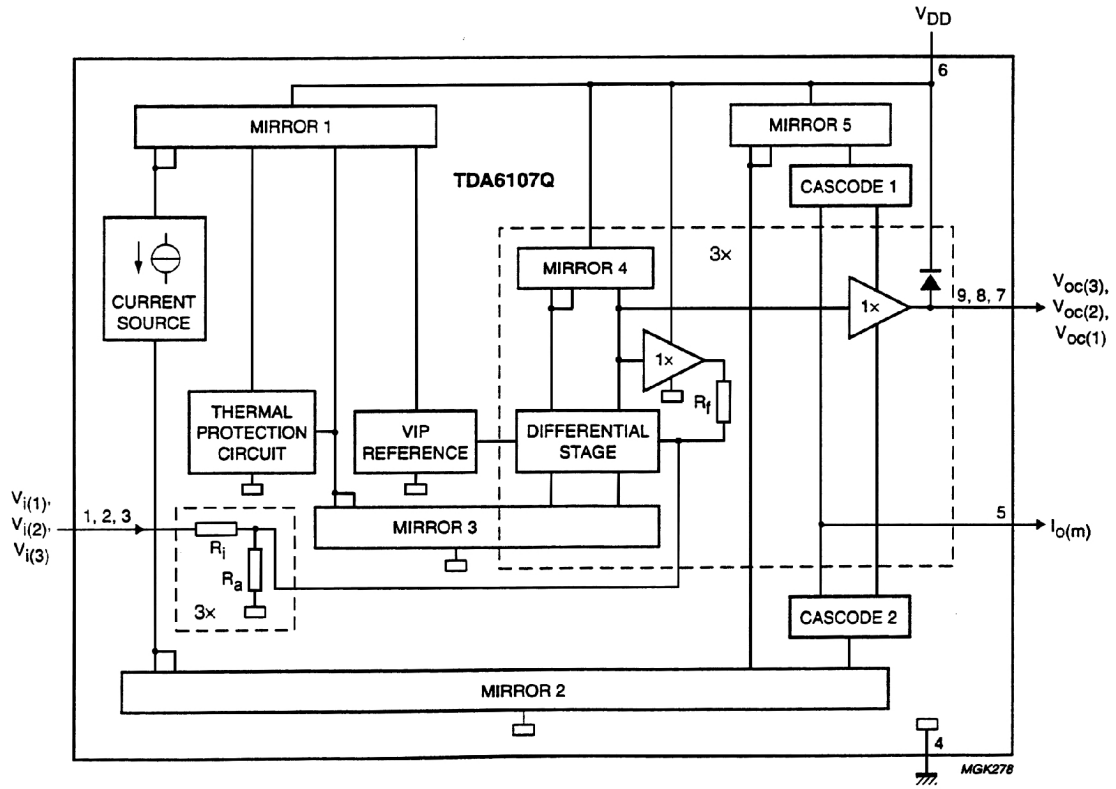
Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/μs
- No external components required
- Very simple application
- Single supply voltage of 200V
- Internal reference voltage of 2.5 V
- Fixed gain of 50.
- Black-current stabilisation (BCS) circuit
- Thermal protection

Pin description

Pin	Symbol	Description
1	$V_{i(1)}$	inverting input 1
2	$V_{i(2)}$	inverting input 2
3	$V_{i(3)}$	inverting input 3
4	GND	ground (fin)
5	I_{om}	black current measurement output
6	V_{DD}	supply voltage
7	$V_{OC(3)}$	cathode output 3
8	$V_{OC(2)}$	cathode output 2
9	$V_{OC(1)}$	cathode output 1





Block diagram TDA6107Q

4-7 24C16 - 16 Kb EEPROM
features :
- 16 Kbit serial I2C bus EEPROM
- Single supply voltage : 4.5 V to 5.5 V
- 1 Million Erase/Write cycles (minimum)
- 40 year data retention (minimum)

Pin description

Pin No.	Name	Description
1, 2, 3	E0, E1, E2	Device address - not used
5	SDA	Serral Data/Address Input/Output
6	SCL	Serial clock
7	WC	Write control
8	Vcc	Supply voltage
4	Vss	Ground

The memory device is compatible with the I2C memory standard. This is a two wire serial interface that uses a bi-directionnal data bus and serial clock. The memory carries a built-in 4-bit unique device type identifier code (1010) in accordance with the I2C bus definition.

Serial Clock (SCL)
The SCL input is used to strobe all data in and out of the memory.
Serial Data (SDA)
The SDA pin is bi-directionnal, and is used to transfer data in or out of the memory

4-8 STR - F6654

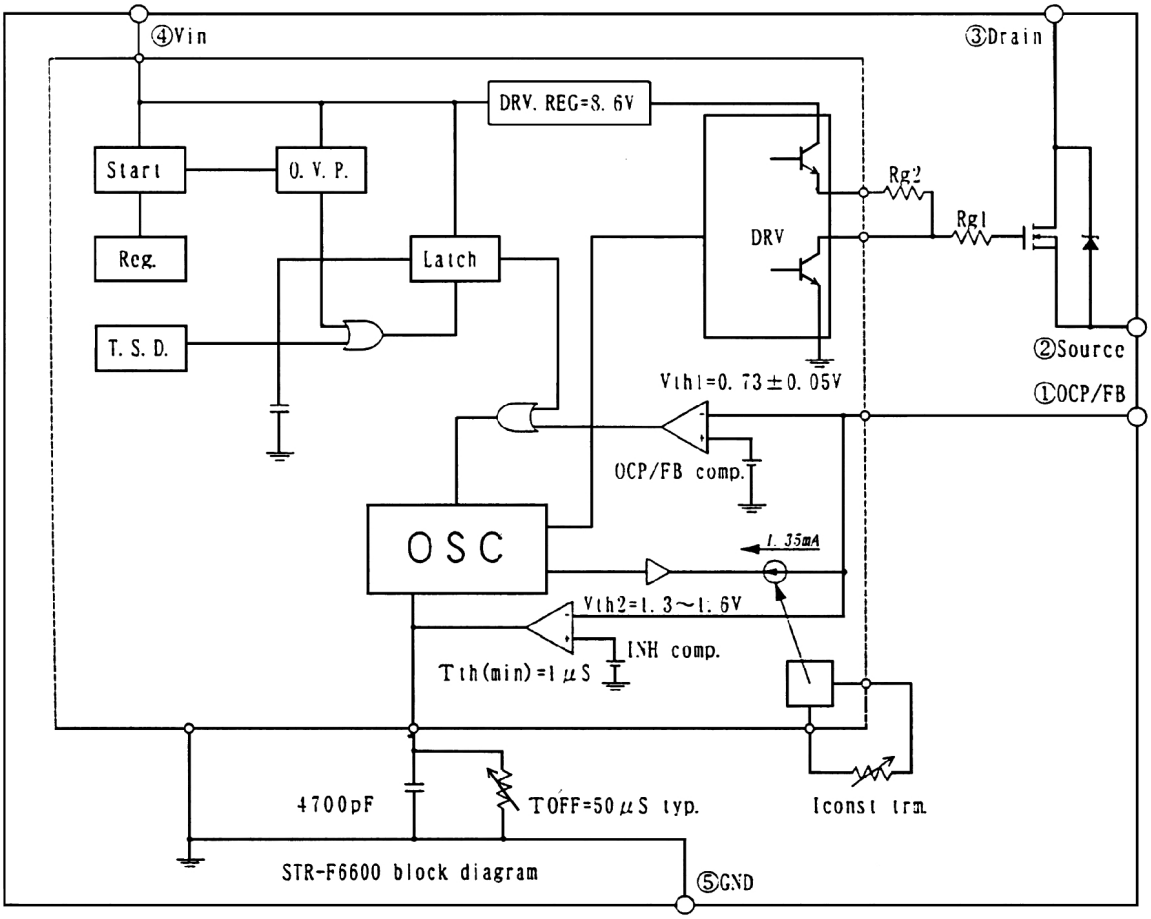
4-8-1 General description

The STR-F6654 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

4-8-2 Features

- Small SIP fully isolated molded 5 pins package
- Many protection functions :
  - * Pulse-by-pulse overcurrent protection (OCP)
  - * Overvoltage protection with latch mode (OVP)
  - * Thermal protection with latch mode (TSD)

4-8-3 Block diagram



4-8-4 Pins description

pin	name	symbol	description
1	Overcurrent / feedback	O.C.P./ F.B.	Input of over current detection signal and feedback signal
2	Source	S	MOSFET source
3	Drain	D	MOSFET drain
4	Supply	V_{IN}	Input of power supply for control circuit
5	Ground	GND	Ground

4-8-5 Control part electrical characteristics

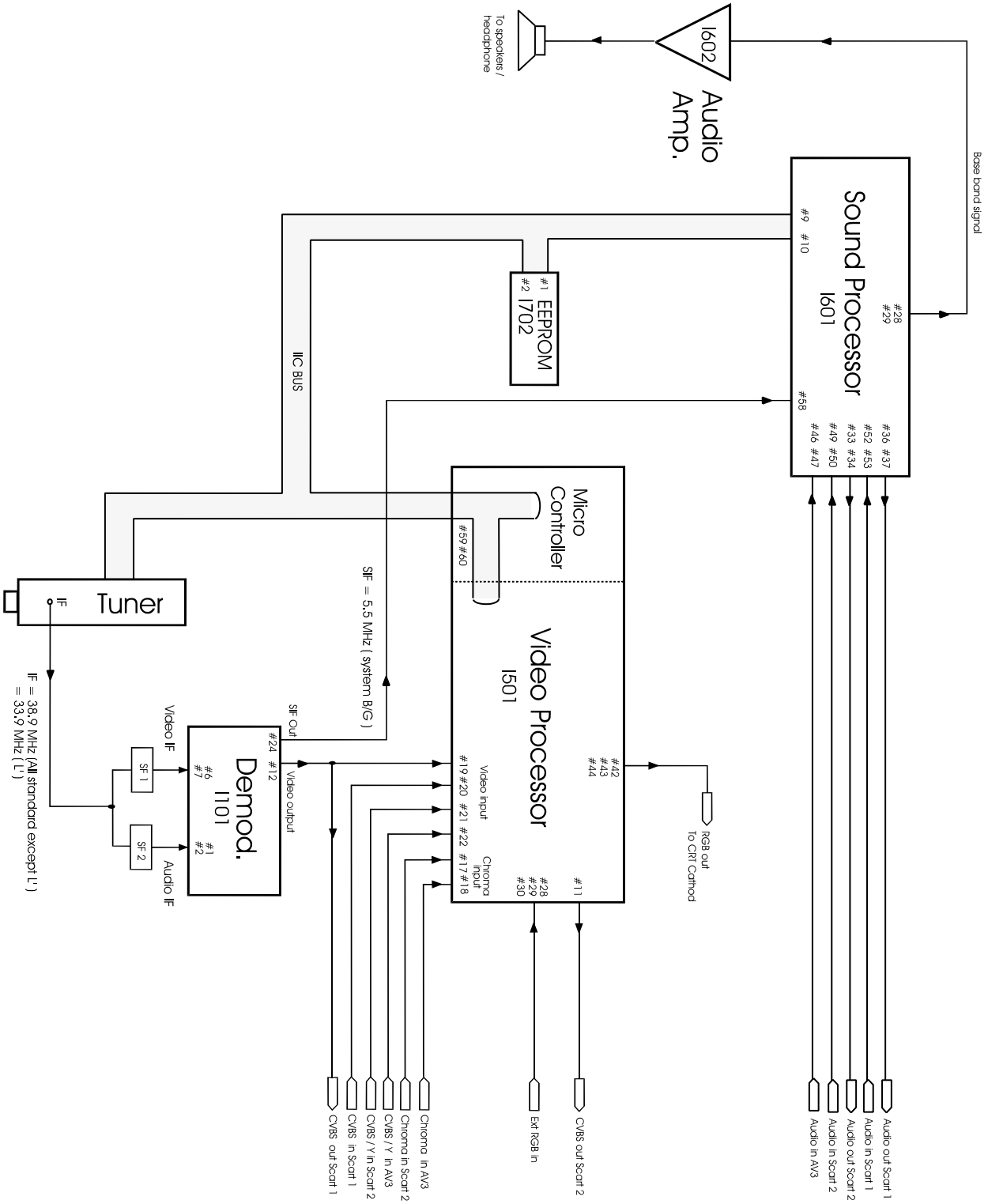
DESCRIPTION	IC PIN NUMBER	SYMBOL	RATING			UNIT
			MIN.	TYPE	MAX	
Operation start voltage	4-5	V_{IN} (on)	14.4	16	17.6	V
Operation stop voltage	4-5	V_{IN} (off)	9	10	111	V
Circuit current in operation	4-5	I_{IN} (on)	-	-	30	mA
Circuit current in non-operation	4-5	I_{IN} (off)	-	-	100 mA	μA
Maximum OFF time	-	T_{OFF} (max)	45	-	55	μSEC
Minimum time for input of quaxi resonant signals	1-5	T_{TH} (2)	-	-	1.0	μSEC
Minimum off time	-	T_{OFF} (min)	-	-	1.5	μSEC
O.C.P./F.B. terminal threshold voltage 1	1-5	V_{TH} (1)	0.68	0.73	0.78	V
O.C.P./F.B. terminal threshold voltage 2	1-5	V_{TH} (2)	1.3	1.45	1.6	V
O.C.P./F.B. terminal extraction current	1-2	$I_{OCP/FB}$	1.2	1.35	1.5	mA
O.V.P. operation voltage	4-5	V_{IN} (OVP)	20.5	22.5	24.5	V
Latch circuit sustaining voltage	4-5	I_{IN} (H)	-	-	400	μA
Latch circuit release voltage	4-5	V_{IN} (La.off)	6.6	-	8.4	V
Thermal shutdown operating temperature	-	T_J (TSD)	140	-	-	^{0}C

4-8-6 MOSFET electrical characteristics

DESCRIPTION	IC PINS NUMBER	SYMBOL	RATING			UNIT
			MIN.	TYPE	MAX	
Drain-to-source break voltage	3-2	V_{DSS}	650	-	-	V
Drain leakage current	3-2	I_{DSS}	-	-	300	μA
On-resistance	3-2	R_{DS} (on)	-	-	1.95	Ω
Switching time	3-2	tf	-	- 2	50	noec
Thermal resistance	-	O_{CH} -F	-	-	0.95	^{0}C/W

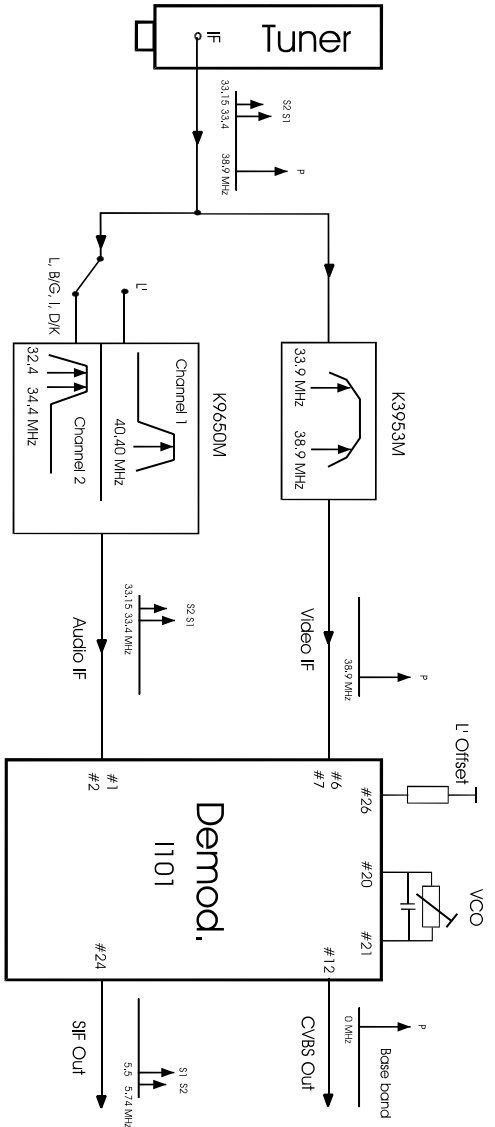
5 - Circuit description

5-1 Block diagram



5-2 IF section

5-2-1 Block diagram



5-2-2 Vision IF Amplifier

The video IF signal (VIF) is fed through a SAW filter to the differential input (Pin 6-7) of the VIF amplifier. This amplifier consists of three AC-coupled amplifier stages. Each differential amplifier is gain controlled by the automatic gain control circuit (VIF-AGC). The output signal of the VIF amplifier is applied to the FPLL carrier generation and the video demodulator.

SAW filters

Ref.	Standard	Features
K3953M	B/G - D/K - I - L/L'	- IF filter for video application - TV IF filter with Nyquist slopes at 33.9 MHz and 38.9 MHz - Constant group delay
K9650M	B/G - D/K - I - L/L'	- IF filter for audio application - TV IF audio filter with two channels - Channel 1 (L') with one pass band for sound carrier at 40.40 MHz - Channel 2 (L, D/K, I, B/G) with one pass band for sound carriers between 32.40 MHz and 33.40 MHz

5-2-3 Tuner-and VIF-AGC

At Pin 8, the VIF-AGC charges/discharges the AGC capacitor to generate a control Voltage for setting the gain of the VIF amplifier and tuner in order to keep the video output signal at a constant level. Therefore, in the case of all negative modulated signals (e.g., B/G standard) the sync. level of the demodulated video signal is the criterion for a fast charge/discharge of the AGC capacitor. For positive modulation (e.g., L standard) the peak white level of video signal controls the charge current. In order to reduce reaction time for positive modulation, where a large time constant is needed, an additional black level detector controls the discharge current in the event of decreasing VIF input signal. The control voltage (AGC voltage at Pin 8) is transferred to an internal control signal, and is fed to the tuner AGC to generate the tuner AGC current at Pin 11 (open collector output). The take over point of the tuner AGC can be adjusted at Pin 10 by a potentiometer or an external dc voltage (from interface circuit or microprocessor).

5-2-4 FPLL, VCO and AFC

The FPLL circuit (frequency phase locked loop) consists of a frequency and phase detector to generate the control voltage for the VCO tuning. In locked mode, the VCO is controlled by the phase detector and in unlocked mode, the frequency detector is superimposed. The VCO operates with an external resonance circuit (L and C parallel) and is controlled by internal varicaps. The VCO control voltage is also converted to a current and represents the AFC output signal at Pin 22. At the AFC switch (Pin 19) three operating conditions of the AFC are possible:
AFC curve "rising" or "falling" and AFC "off". A practicable VCO alignment of the external coil is the adjustment to zero AFC output current at Pin 22. At center frequency the AFC output current is equal to zero. Furthermore, at Pin 14, the VCO center frequency can be switched for setting to the required L' value (L' standard). The optional potentiometer at Pin 26 allows an offset compensation of the VCO phase for improved sound quality (fine adjustment). Without a potentiometer (open circuit at Pin 26), this offset compensation is not active. The oscillator signal passes a phase shifter and supplies the in-phase signal (0^o) and the quadrature signal (90^o) of the generated picture carrier.

5-2-5 Video Demodulation and Amplifier

The video IF signal, which is applied from the gain controlled IF amplifier, is multiplied with the in-phase component of the VCO signal. The video demodulator is designed for low distortion and large bandwidth. The demodulator output signal passes an integrated low pass filter for attenuation of the residual vision carrier and is fed to the video amplifier. The video amplifier is realised by an operational amplifier with internal feedback and 8 MHz bandwidth (–3 dB). A standard dependent dc level shift in this stage delivers the same sync. level for positive and negative modulation. An additional noise clipping is provided. The video signal is fed to VIF-AGC and to the video output buffer. This amplifier with a 6 dB gain offers easy adaptation of the sound trap. For nominal video IF modulation the video output signal at Pin 12 is 2 Vpp.

5-2-6 Sound IF Amplifier and SIF-AGC

The SIF amplifier is nearly identical with the 3-stage VIF amplifier. Only the first amplifier stage exists twice and is switchable by a control voltage at Pin 3. Therefore with minimal external expense it is possible to switch between two different SAW filters. Both SIF inputs features excellent cross-talk attenuation and an input impedance which is independent from the switching condition. The SIF-AGC is related to the average level of AM- or FM-carrier and controls the SIF amplifier to provide a constant SIF signal to the AM demodulator and QPS mixer.

5-2-7 Quasi-Parallel-Sound (QPS) Mixer

The QPS mixer is realised by a multiplier. The SIF signal (FM or NICAM carrier) is converted to the intercarrier frequency by the regenerated picture carrier (quadrature signal) which is provided from the VCO. The intercarrier signal is fed via an output amplifier to Pin 24.

5-2-8 Standard Switch

To have equal polarity of the video output signal the polarity can be switched in the demodulation stage in accordance with the TV standard. Additionally a standard dependent dc level shift in the video amplifier delivers the same sync. level. In parallel to this, the correct VIF-AGC is selected for positive or negative modulated VIF signals. In the case of negative modulation (e.g., B/G standard) the AM output signal is switched off. For positive modulation (L standard) the AM demodulator and QPS mixer is active. This condition allows a parallel operation of the AM sound signal and the NICAM-L stereo sound.

5-2-9 L' Switch

With a control voltage at Pin 14 the VCO frequency can be switched for setting to the required L' value (L' standard). Also a fine adjustment of the L'-VCO center frequency is possible via a potentiometer. The L' switch is only active for positive modulated video IF-signals (standard switch in L mode).

5-2-10 Internal Voltage Stabiliser

The internal bandgap reference ensures constant performance independent of supply voltage and temperature.

5-3 Video - VCT description

5-3-1 Introduction

The VCT 38xxA includes complete video, display, and deflection processing.
All processing is done digitally, the video front-end and video back-end are interfacing to the analogue world.
Most functions can be controlled by software via I 2 C bus slave interface.

5-3-2 Video Front-end

This block provides the analogue interfaces to all video inputs and mainly carries out analogue-to-digital conversion for the following digital video processing. Most of the functional blocks in the front-end are digitally controlled (clamping, AGC, and clock-DCO). The control loops are closed by the Fast Processor ('FP') embedded in the video decoder.

5-3-3 Input Selector

Up to seven analogue inputs can be connected. Four inputs are for input of composite video or S-VHS luma signal. These inputs are clamped to the sync back porch and are amplified by a variable gain amplifier. Two chroma inputs can be used for connection of S-VHS carrier-chrominance signal. These inputs are internally biased and have a fixed gain amplifier.

5-3-4 Clamping

The composite video input signals are AC-coupled to the IC. The clamping voltage is stored on the coupling capacitors and is generated by digitally controlled current sources. The clamping level is the back porch of the video signal.
S-VHS chrominance is also AC-coupled. The input pin is internally biased to the center of the ADC input range. Each channel is sampled at 10.125 MHz with a resolution of 8 bit.

5-3-5 Automatic Gain Control

A digitally working automatic gain control adjusts the
magnitude of the selected baseband.

5-3-6 Digitally Controlled Clock Oscillator

The clock generation is also a part of the analogue front-end. The crystal oscillator is controlled digitally by the control processor. The clock frequency can be adjusted within ±150 ppm. This adjustment is done in factory for every TV set.

5-3-7 Analogue Video Output

The input signal of the Luma ADC is available at the analogue video output pin (#11). The signal at this pin is buffered by a source follower. The output voltage is 2 V. The magnitude is adjusted with an AGC in 8 steps together with the main AGC.

5-3-8 Adaptive Comb Filter (VCT3834A only)

The adaptive comb filter is used for high-quality luminance/chrominance separation for PAL or NTSC signals. The comb filter improves the luminance resolution (bandwidth) and reduces interferences like cross-luminance and cross-color artefacts. The adaptive algorithm can eliminate most of the mentioned errors without introducing new artefacts or noise. The filter uses two line delays to process the information of three adjacent video lines. To have a fixed phase relationship of the colour subcarrier in the three channels, the system clock (20.25 MHz) is fractionally locked to the colour subcarrier. This allows the processing of all colour standards and substandards using a single crystal frequency. The CVBS signal in the three channels is filtered at the subcarrier frequency by a set of bandpass/ notch filters. The output of the three channels is used by the adaptation logic to select the weighting that is used to reconstruct the luminance/chrominance signal from the 4 bandpass/notch filter signals. By using soft mixing of the 4 signals switching artefacts of the adaption algorithm are completely suppressed. The comb filter uses the middle line as reference, therefore, the comb filter delay is one line. If the comb filter is switched off, the delay lines are used to pass the luma/ chroma signals from the A/D converters to the luma/ chroma outputs. Thus, the comb filter delay is always one line.

5-3-9 Color Decoder

In this block, the standard luma/chroma separation and multi-standard colour demodulation is carried out. The colour demodulation uses an asynchronous clock, thus allowing a unified architecture for all colour standards.
The colour killer uses the burst-phase/ burst-frequency measurement to identify a PAL/NTSC or SECAM colour signal. For PAL/NTSC, the colour is switched off (killed) as long as the colour subcarrier PLL is not locked. For SECAM, the killer is controlled by the toggle of the burst frequency. The burst amplitude measurement is used to switch-off the colour if the burst amplitude is below a programmable threshold. Thus, colour will be killed for very noisy signals. The colour amplitude killer has a programmable hysteresis.
The burst-frequency measurement is also used for automatic standard recognition (together with the status of horizontal and vertical locking) thus allowing a completely independent search of the line and colour standard of the input signal. The following standards can be distinguished:
PAL B,G,H,I; NTSC M; SECAM; NTSC 44; PAL M; PAL N; PAL 60. In AV mode or when Prg No 0 is selected all the standards above are enabled by the controlling software. In INSTALL menu the controlling software enables PAL B,G, H,I and SECAM detection. The colour standard for each program number is stored in EEPROM. Outside INSTALL menu and for programmes numbers 1 to 99, the auto colour detection is disabled, the colour standard is recall from EEPROM and forced.

5-3-10 Horizontal Scaler (VCT3834A only)

The 4:2:2 YC r C b signal from the colour decoder is processed by the horizontal scaler. The scaler block allows a linear or nonlinear horizontal scaling of the input video signal in the range of 0.25 to 4. Nonlinear scaling, also called “Panoramavision”, provides a geometrical distortion of the input picture. It is used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders. Also, the inverse effect can be produced by the scaler. The scaler contains a programmable decimation filter, a 1-line FIFO memory, and a programmable interpolation filter.

5-3-11 Video Sync Processing

To extract the sync information from the video signal, a linear phase low-pass filter eliminates all noise and video contents above 1 MHz. The sync is separated by a slicer; the sync phase is measured. A variable window can be selected to improve the noise immunity of the slicer. The phase comparator measures the falling edge of sync, as well as the integrated sync pulse. The sync phase error is filtered by a phase-locked loop that is computed by the Fast Processor. All timing in the front-end is derived from a counter that is part of this PLL, and it thus counts synchronously to the video signal. A separate hardware block measures the signal back porch and also allows gathering the maximum/minimum of the video signal. This information is processed by the FP and used for gain control and clamping. For vertical sync separation, the sliced video signal is integrated. The FP uses the integrator value to derive vertical sync and field information. The information extracted by the video sync processing is multiplexed onto the hardware front sync signal (FSY) and is distributed to the rest of the video processing system.
The data for the vertical deflection, the sawtooth, and the East-West correction signal is calculated by the VCT 38xxA.

5-3-12 Display Processing

In the display processing the conversion from digital YC r C b to analogue RGB is carried out.
In the luminance processing path, contrast and brightness adjustments and a variety of features, such as black-level expansion, dynamic peaking and soft limiting, are provided. In the chrominance path, the C r C b signals are converted to 4:4:4 format and filtered by a colour transient improvement circuit. The YC r C b signals are converted by a programmable matrix to RGB colour space. The digital OSD insertion circuit allows the insertion of a 5-bit OSD signal.
The OSD signals and the display clock are synchronised to the horizontal flyback.

5-3-13 Chroma Transient Improvement

The intention of this block is to enhance the chroma resolution. A correction signal is calculated by differentiation of the colour difference signals. The differentiation can be selected according to the signal bandwidth, e.g. for PAL/NTSC/SECAM or digital component signals, respectively. The amplitude of the correction signal is adjustable. Small noise amplitudes in the correction signal are suppressed by an adjustable coring circuit. To eliminate 'wrong colours' which are caused by over and undershoots at the chroma transition, the sharpened chroma signals are limited to a proper value automatically.

5-3-14 Video Back-end

The digital RGB signals are converted to analogue RGBs using three video digital-to-analogue converters (DAC) with 10-bit resolution. An analogue brightness value is provided by three additional DACs. The adjustment range is 40 % of the full RGB range. Controlling the white-drive/analogue brightness and also the external contrast and brightness adjustments is done via the Fast Processor, located in the front-end. Control of the cutoff DACs is done via I 2 C bus registers. Finally cutoff and blanking values are added to the RGB signals. Cutoff (dark current) is provided by three 9-bit DACs. The adjustment range is 60 % of full scale RGB range. The analogue RGB-outputs are current outputs with current-sink characteristics. The maximum current drawn by the output stage is obtained with peak white RGB. An external half contrast signal can be used to reduce the output current of the RGB outputs to 50% . Cutoff and white-drive current measurement are carried out during the vertical blanking interval. They always use the small bandwidth setting.

5-3-15 CRT Measurement and Control

The display processor is equipped with an 8-bit ADC for all measuring purposes. The ADC is connected to the SENSE input pin. Cutoff and white-drive current measurement are carried out during the vertical blanking interval.

5-3-16 Average Beam Current Limiter

The average beam current limiter (BCL) uses the SENSE input for the beam current measurement. The BCL uses a different filter to average the beam current during the active picture. The filter bandwidth is approx. 2 kHz. The beam current limiter has an automatic offset adjustment that is active two lines before the first cutoff measurement line. The beam current limiter function is located in the front-end. The data exchange between the front-end and the back-end is done via a single-wire serial interface. The beam current limiter allows the setting of a thresh-old current. If the beam current is above the threshold, the excess current is low-pass filtered and used to attenuate the RGB outputs by adjusting the white-drive multipliers for the internal (digital) RGB signals, and the analogue contrast multipliers for the analogue RGB inputs, respectively. The lower limit of the attenuator is programmable, thus a minimum contrast can always be set. During the tube measurement, the ABL attenuation is switched off. After the white-drive measurement line it takes 3 lines to switch back to BCL limited drives and brightness.

5-3-17 Analogue RGB Insertion

The VCT 38xxA allows insertion of external analogue RGB signals. The RGB signal is key-clamped and inserted into the main RGB by the Fast-Blank switch. The external RGB input can be overlaid or underlaid to the digital picture. The external RGB signals can be adjusted independently as regards DC level (brightness) and magnitude (contrast). All signals for analogue RGB insertion (RIN, GIN, BIN, FBLIN) must be synchronised to the horizontal flyback, otherwise a horizontal jitter will be visible. The VCT 38xxA has no means for timing correction of the analogue RGB input signals. RGB signals are not digitalised and therefore cannot be processed by the picture scaler.

5-3-18 Fast-Blank Monitor

The presence of external analog RGB sources can be detected by means of a Fast-Blank monitor. With a special monitor logic it is possible to detect if there is an external RGB source active and if it is a full screen insertion or only a box. The monitor logic is connected directly to the FBLIN pin. The controlling software uses this information to disable all picture format using display scaler.

5-3-19 Vertical and East/West Deflection

The calculations of the vertical and East/West deflection waveforms is done by the internal Fast Processor (FP). The algorithm uses a chain of accumulators to generate the required polynomial waveforms. To produce the deflection waveforms, the accumulators are initialised at the beginning of each field. The initialisation values must be computed by the TV control processor and are written to the front-end once.

5-3-20 EHT Compensation

The vertical waveform can be scaled according to the average beam current. This is used to compensate the effects of electric high-tension changes due to beam current variations. EHT compensation for East/West deflection is done with an offset corresponding to the average beam current.

5-3-21 Reset Function

Reset of all VDP functions is performed by the RESQ pin. When this pin becomes active, all internal registers and counters are lost.

5-3-22 Standby and Power-On

The VDP does not have a standby mode. To disable all the analogue and digital video functions, it is necessary to switch off the supplies for analogue front-end (VSUP AF), analogue back-end (VSUP AB) and digital circuitry (VSUP D).

5-4- Microcontroller

5-4-1 Introduction

The TV controller basically consists of the CPU, RAM, ROM, and a number of peripheral modules.
For instance:
– a memory banking module is included to allow access to more than 64 kB memory.
– a bootloader softw re is included to allow in-system-downloading of external code to Flash memory via the I 2 C interface.
The TV controller runs the complete software necessary to control a TV set. The software includes control of the audio, video, OSD, and text processors on chip, as well, as control of external devices like tuner or stereo decoder. Communication between the TV controller and external devices is done either via I 2 C bus interface or via programmable port pins. The TV Controller is clocked with f OSC = f XTAL /2.

5-4-2 CPU

The CPU is fully compatible to WDC's W65C02 micro-processor. The processor has 8-bit registers/accumulator, an 8-bit data bus, and a 16-bit address bus.

5-4-3 μ- Controller I/O pin configuration and function

There exist different kinds of ports. The universal ports serve as digital I/O and have additional special input and output functions. A subset of the universal ports serves as input for the analogue-to-digital converter.

μ - Controller I/O pin configuration and function table

pin	name	configuration		description
		Stand by	TV ON	
1	Power	Push Pull Low	Push Pull High	Switch OFF / ON SMPS
2	AGC	High impedance	High impedance	Tuner AGC level input – For factory use only
5	Mod SW	High impedance	Push Pull	High = Negative modulation, Low = Positive modulation (L/L').
6	SECAM L'	High impedance	Push Pull	Low = L, High =L'
7	AFC	High impedance	High impedance	ADC input
8	IR	High impedance	High impedance	Interrupt input
9	SC1 SW	High impedance	High impedance	SCART 1 slow switching – ADC input
10	SC2 SW	High impedance	High impedance	SCART 2 slow switching – ADC input
61	Mute	Push Pull	Push Pull	High = Mute active
62	LED	Open Drain	Open Drain	
63	KB	High impedance	High impedance	Keyboard input – ADC input
64	OCP	High impedance	High impedance	Over Current Protection – Switch the set to Std by if < 2.

To reduce power consumption in stand by mode all ports not used are configured in high impedance mode.

5-4-4 Tuning

The AFC information is supplied by the demodulator IC, and becomes available on VCT pin 7 for controlling software. The controlling software uses this information for tuner frequency tracking (automatic following). The AFC window is typically between 50 KHz and 100 KHz.
The minimum frequency step of the tuner is 50 Khz.
This AFC function is disabled when a program is tuned using the direct frequency entry or after fine tuning adjustment. Therefore it is recommended to tune channel with the TV search function (manual or ATSS) or using the direct channel entry to enable the Automatic Frequency Control.

5-4-5 Automatic Format switching and WSS

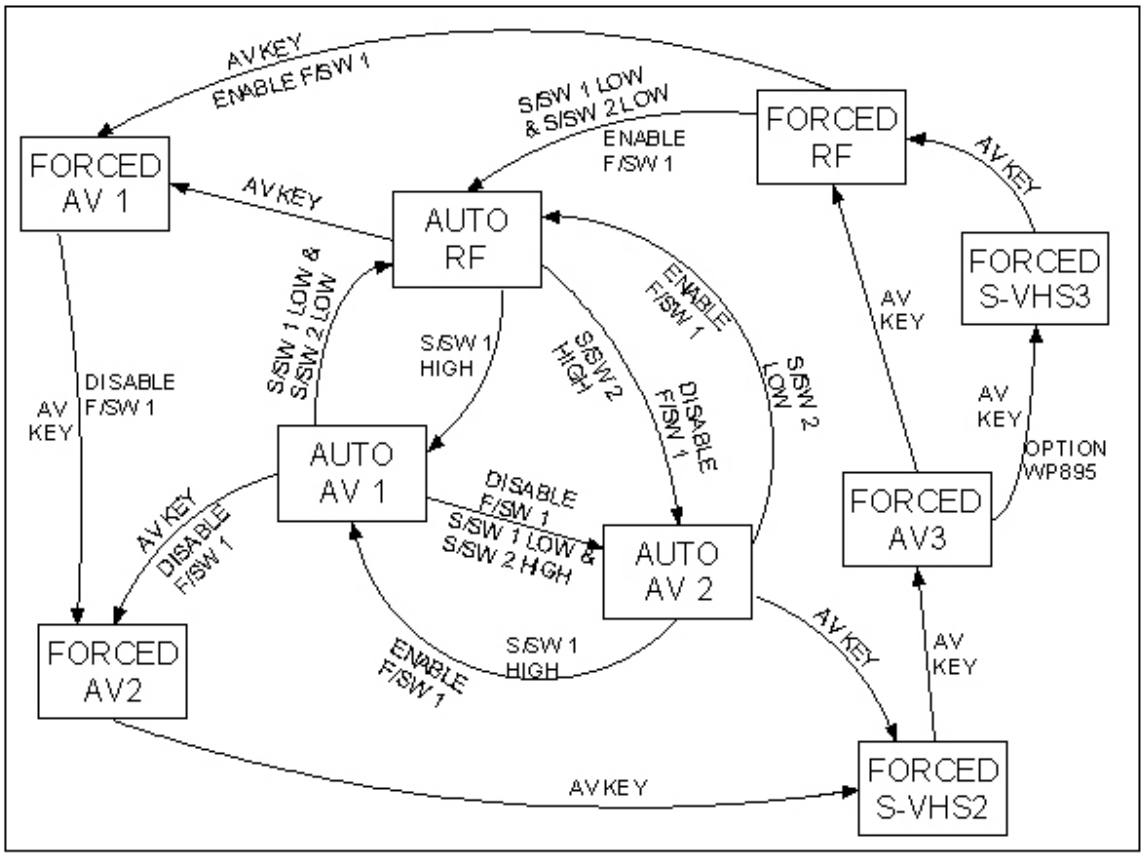
When AUTO mode is selected by the user, the television will automatically select a mode for the user. The format information is supplied by SCART pin 8 level when in AV mode or by WSS data. The signal contains codes as defined in the WSS European Telecommunication Standard, ETS 300 294. Briefly, the signal is received at the beginning of line

23, in each frame. This is bi-phase encoded using a clock frequency of 5 MHz. In total, 14 data bits are available, in 4 groups. Group 1 contains the codes for the received format.
The mode chosen is defined by the following table. In effect the default mode is full screen.
The table below gives a summary of the FORMAT modes available (for WP895 and WP895F), and their given properties.

Format Name(OSD)	Zoom factor – TV with 16:9 CRT		Description	Application
	Vertical	Horizontal		
4:3	100%	75%	Picture is centred with black bars at the left and right hand side of the display	Standard 4/3 picture with 576 active lines
14:9	114%	87%	Picture is centred with black bars at the left and right hand side of the display	14:9 picture – letter box format with 504 active lines
ZOOM 14:9	114%	100%	Picture is displayed filling the full width of the screen by incorporating a small horizontal geometrical error (typically 8% linear)	14:9 picture – letter box format with 504 active lines
ZOOM 16:9	133%	100%	Picture is displayed filling the full screen (width and height)	16:9 picture – letter box format with 430 active lines
PANORAMA	100%	100%	Picture is displayed filling the full screen (width and height)	Used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders.

5-4-6 EXTERNAL source control logic

The following schematic, illustrates the logic of control for the two SCART connectors.



The terms used in the schematic are described below ;

1. AUTO represents a situation where the television has self-selected its picture source. This could be when the SCART SLOW SWITCHING pin has gone to a high state, and the AV 1 input is selected without the intervention of the user.
2. FORCED represents the change of source which has been commanded by the user (using the EXTERNAL button). The user always has priority, and can override the AUTO change of source by the television.
3. AV KEY represents the EXTERNAL button of the remote control, or on the television.
4. S/SW 1, or S/SW 2 represent the SLOW SWITCHING inputs of the first SCART (AV 1) or second SCART (AV 2), these each being pin number 8.
5. F/SW 1 represents the FAST SWITCHING input of the first SCART (AV 1), on pin number 16. The second SCART, AV 2, input does not possess a FAST SWITCHING input.

The HIGH state of a slow switching input represents the request from the external source to be selected by the television. Whether this is accepted or not depends on the position in the logic diagram. The general rule is that the user always has priority, so the use of the AV KEY will always result in a defined logic path being followed.
Under certain circumstances, defined in the diagram, the change of state of a slow switching input will result in the automatic change of source by the television. This change, such as the change from RF broadcast to the AV 1 input,

can always be overridden by the user after the event.
Each line on the diagram, with its associated text, represents the exact conditions under which the change of state will occur. Sometimes this will be accompanied by another action which will be automatically performed by the television, being to either ENABLE or DISABLE F/SW 1.

5-4-7 Over Current Protection

In case of overload, the SMPS secondary voltages will drop. The voltage on pin 64 of microcontroller drops below a reference voltage (2.26V). The controlling software which continuously monitors this voltage will switch the set to stand by mode. To power on the set again the user must switch it off using the main power switch. Appropriate hysteresis guaranrees a reliable operation.

5-5 Teletext Display

National character option bits C12, C13, C14 are transmitted in the page header of a given teletext page. The national option bits are intended to change (or exchange) 13 characters within the G0 character set, according to the needs of each national language. However, for Cyrillic and Greek languages, a major character set change (a change of character mapping) needs to effected for correct display.
These codes represent, for a given broadcaster, the intended language that the teletext page should be displayed in. As there are only 3 bits, there are only 8 codes available to cover all the possible language combinations. This means that for a received code there are several possibilities meanings, and therefore several possibilities for display.
This is not as bad as it first seems, as we use the user-selected OSD language to identify the intention of the broadcaster. For example, a user wishing to see Russian teletext should select Russian OSD language, otherwise he would not have correct teletext display on the TV.
The table below allows the reader to understand the relationship between selected OSD language (which is under user control), the teletext language display (selected by national option bits in transmission page header) and the language mapping (either Latin or Greek/Cyrillic)

An example: For Greek teletext display, (if national option code 1 1 1 is received from the broadcaster), the user should select the Greek OSD language. Even if English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian or Swedish OSD languages are selected, the teletext will be correctly displayed.
However, if Polish, Hungarian, Czech, Slovakian, Rumanian or Russian OSD are selected, Latin font mapping is selected. The consequence will be incorrect teletext display, with NO GREEK CHARACTERS DISPLAYED. Romanian national font options will be selected.

OSD Language	C 12	C 13	C 14	Teletext Language	ESC Teletext Language	Mapping
English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek	0	0	0	English	English	Latin
	0	0	1	German	German	Latin
	0	1	0	Swedish/Finnish	Swedish/Finnish	Latin
	0	1	1	Italian	Italian	Latin
	1	0	0	French	French	Latin
	1	0	1	Spanish	Spanish	Latin
	1	1	0	Turkish	Turkish	Latin
	1	1	1	English	Greek	Greek/Cyrillic
Polish, Hungarian, Czech, Slovakian, Rumanial	0	0	0	Polish	Polish	Latin
	0	0	1	German	German	Latin
	0	1	0	Hungarian	Hungarian	Latin
	0	1	1	Lettish/Lithuanian	Lettish/Lithuanian	Latin
	1	0	0	French	French	Latin
	1	0	1	Serb/Croat/Slovenian	Serb/Croat/Slovenian	Latin
	1	1	0	Czech/Slovak	Czech/Slovak	Latin
	1	1	1	Rumanian	Rumanian	LatinRussian
Russian	0	0	0	English	Serbian/Montenegrin	Greek/Cyrillic
	0	0	1	German	German	Latin
	0	1	0	Estonian	Estonian	Latin
	0	1	1	Lettish/Lithuanian	Lettish/Lithuanian	Latin
	1	0	0	English	Russian/Bulgarian	Greek/Cyrillic
	1	0	1	English	Ukrainian	Greek/Cyrillic
	1	1	0	Czech/Slovak	Czech/Slovak	Latin
	1	1	1	Rumanian	Rumanian	Latin

5-6 Sound processing

5-6-1 Analogue sound IF - input section

The input pins ANA_IN1+ and ANA_IN- offer the possibility to connect sound IF sources to the MSP 341xD. The analogue-to-digital conversion of the preselected sound IF signal is done by an A/D converter, whose output is used to control an analogue automatic gain circuit (AGC), providing an optimal level for a wide range of input levels.

5-6-2 Quadrature Mixers

The digital input coming from the integrated A/D converter may contain audio information at a frequency range of theoretically 0 to 9 MHz corresponding to the selected standards. By means of two programmable quadrature mixers, two different audio sources ; for example, NICAM and FM-mono, may be shifted into baseband position.

5-6-3 Phase and AM discrimination

The filtered sound IF signals are demodulated by means of the phase and amplitude discriminator block. On the output, the phase and amplitude is available for further processing.
AM signals are derived from the amplitude information, whereas the phase information serves for FM and NICAM demodulation.

5-6-4 NICAM decoder

In case of NICAM - mode, the phase samples are decoded according the DQPSK - coding scheme. The output of this block contains the original NICAM bitstream.

5-6-5 DSP section

All audio baseband functions are performed by digital signal processing (DSP). The DSP section controls the source and output selection, and the signals processing.

5-6-6 Sound Mode switching

In case of NICAM transmission, the controlling software reads the bit error rate and the operation mode from the NICAM Decoder. When the set is in “Auto detection” mode (default mode after ATSS) the controlling software sets automatically the sound mode (NICAM mono, NICAM Dual 1 or NICAM Dual 2) depending on the transmitted mode.
In the case of 2 Carrier FM transmission, the controlling software read the transmission mode and the signal quality level from the Stereo Detection Register. When the set is in “Auto detection” mode the controlling software automatically sets the sound mode (mono, Stereo, Dual 1, Dual 2) depending on the transmitted mode.
In “Auto detection” mode the controlling software evaluates the signal quality and automatically switches to the analogue sound carrier 1, if the transmission quality is too poor. To avoid unwanted automatic switching the threshold levels mono to stereo and stereo to mono are different.
In “forced mono “ mode (Red OSD in status Display Window), the controlling software configures the MSP341xD to demodulay the analogue (FM or AM) sound carrier 1, no matter the signal quality. The sound mode “ forced “ or “ Autodetect” is stored for each programme.

5-7 Sound amplification

The TDA8944J (TDA8946J) is a stereo BTL audio amplifier capable of delivering 2 x 7 W (2 x 15 W) output power to an 8 W load at THD = 10%, using a 12 V power supply and an external heatsink. The voltage gain is fixed at 32dB.

With the three-level MODE input the device can be switched from ‘standby’ to ‘mute’ and to ‘operating’ mode.
The TDA 8944J outputs are protected by an internal thermal shutdown protection mechanism and short-circuit protection.

5-7-1 Power amplifier

The power amplifier is a Bridge Tied Load (BTL) amplifier with an all-NPN output stage, capable of delivering a peak output current of 1.5 A.
The BTL principle offers the following advantages :
- Lower peak value of the supply current.
- The ripple frequency on the supply voltage is twice the signal frequency.
- No DC-blocking capacitor
- Good low frequency performance

5-7-2 Mode selection

The TDA894xJ has several functional modes, which can be selected by applying the proper DC voltage to pin MODE.

Mute : In this mode the amplifier is DC biased but not operational (no audio output). This allows the input coupling capacitors to be charged to avoid pop-noise. The device is in mute mode when $2.5\ V < V_{MODE} < (Vcc-1.5\ V)$.

Operating : In this mode the amplifier is operating normally. The operating mode is activated at $V_{MODE} < 0.5\ V$.

5-8 Vertical deflection

The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. The differential input circuit is voltage driven. The input circuit is especially intended for direct connection to driver circuits which deliver symmetrical current signals, but is also suitable for asymmetrical currents. The output current of these devices is converted to voltages at the input pins via resistors R350 and R351. The differential input voltage is compared with the output current through the deflection coils measured as voltage across R398, which provides internal feedback information. The voltage across R398 is proportional to the output current.

5-8-1 Flyback voltage

The flyback voltage is determined by an additional supply voltage V_{flb}. The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage Vp optimum for the scan voltage and the second supply voltage V_{flb} optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage V_{flb} is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor.

5-8-2 Protection

The output circuit has protection circuits for :
- Too high die temperature
- overvoltage of output stage A

5-8-3 Guard circuit

The guard signal is not used.

5-8-4 Damping resistor

For HF loop stability a damping resistor (R331) is connected across the deflection coil.

5-8-5 EAST-WEST Amplifier (TDA8358J)

The East-West amplifier is current driven. It can only sink currents of the diode modulator circuit. A feedback resistor R397 is connected between the input and output of this inverting amplifier in order to convert the East-West correction input into an output voltage.

5-9 Power supply (STR F6654)

5-9-1 STR-F6654 general description

The STR-F6654 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

5-9-2 Power supply primary part operations

An oscillator generates pulses signals which turn on and off a MOSFET transistor.

5-9-2-1 Start-up circuit : V_{IN}

The start-up circuit is used to start and stop the operation of the control IC, by detecting a voltage appearing at V_{IN} pin (pin 4).

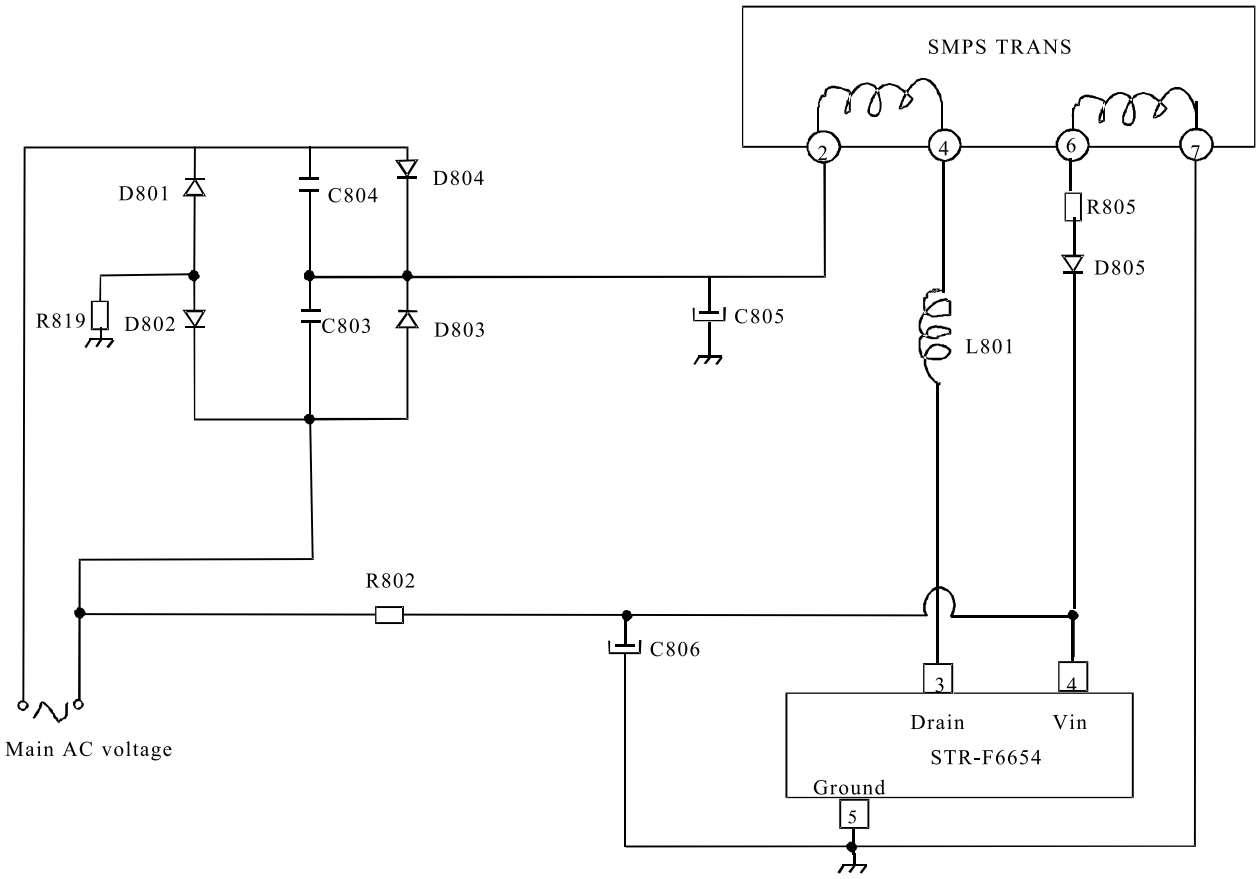


Fig : Power supply start-up circuit

When the power switch is pushed on, V_{IN} increases slowly. During this time, C806 is charged through R802.

As soon as V_{IN} reaches 16V, the STR-F6654 control circuit starts operating. Then, V_{IN} is obtained by smoothing the winding voltage which appears between pin6 and pin7 of the SMPS transformer.

As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating, V_{IN} starts dropping. However, as this winding voltage reaches the set value before V_{IN} voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below V_{IN} voltage at start-up). R805 resistor prevents that V_{IN} pin voltage varies according to the secondary side output current.

V_{IN} must be set higher than the shutdown voltage (V_{IN} (off) = $11V_{max}$) and lower than the O.V.P. (overvoltage protection) operating voltage
(V_{OVP} = $20.5V_{min}$)

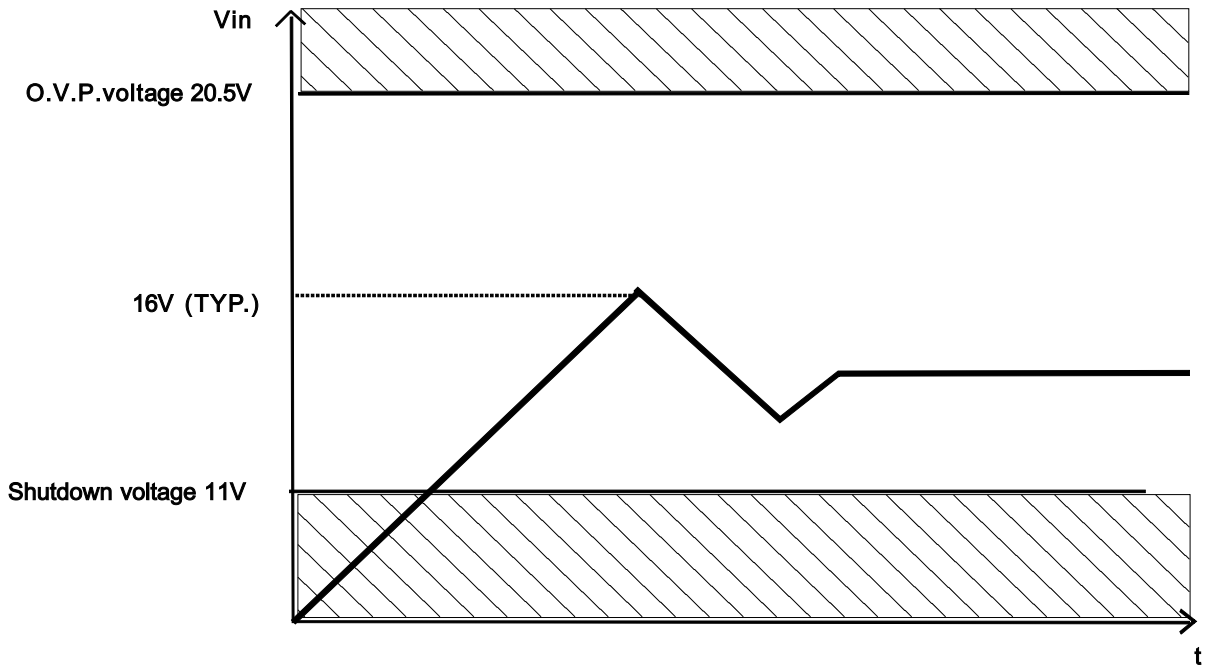


Fig : Waveform of Vin pin voltage at start-up

5-9-2-2 STR-F6654 oscillating operation

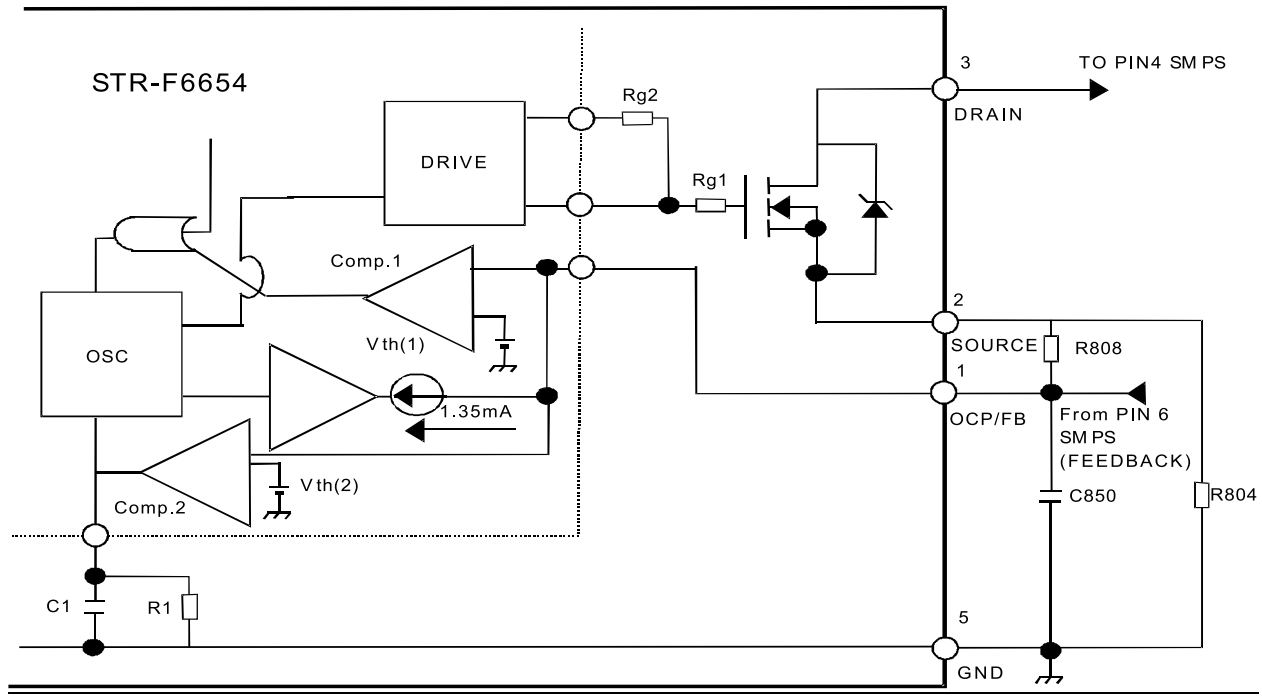


Fig : Oscillating operation

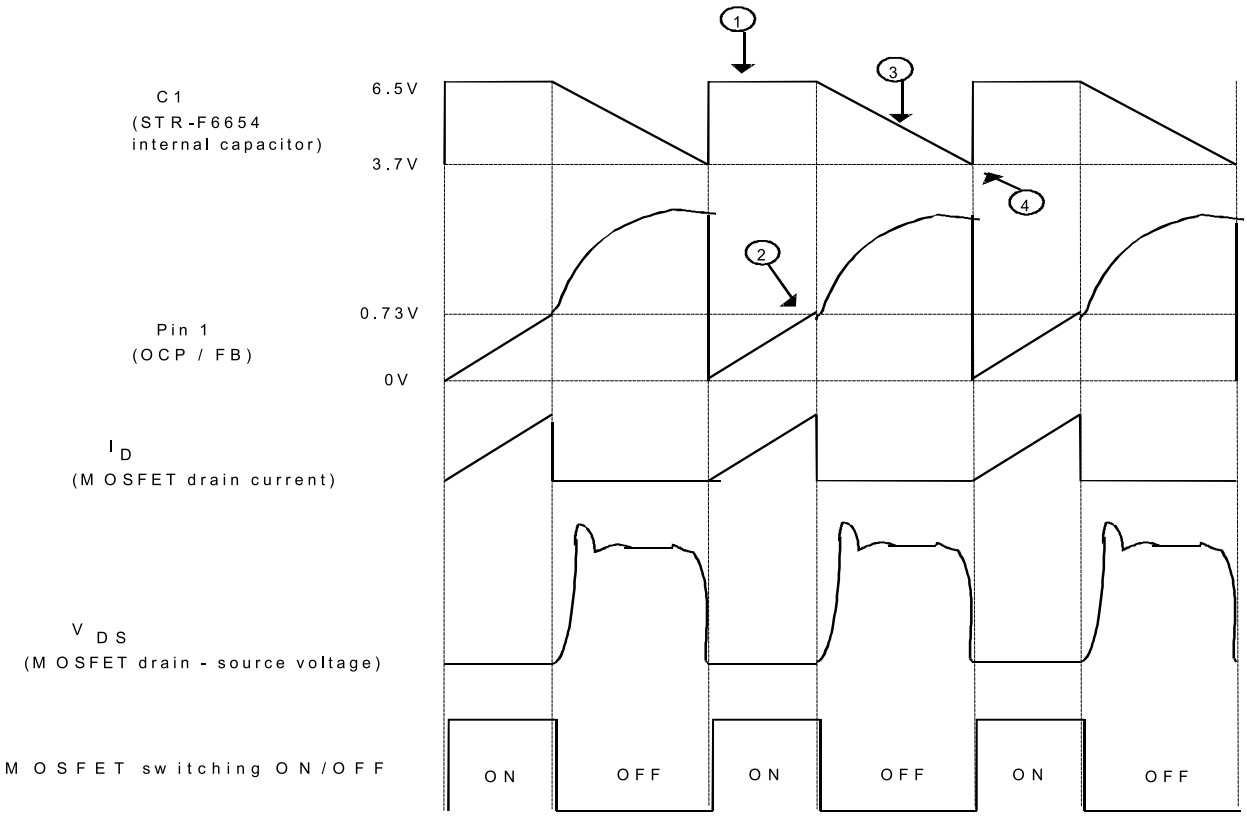


Fig : Waveforms during oscillating operation

①When the MOSFET is ON, the STR-F6654 internal capacitor C1 is charged at the constant voltage 6.5V.
At the same time, the voltage at pin 1 (OCP / FB) increases with the same waveform as the MOSFET drain current.

②When the pin 1 voltage reaches the threshold voltage V_{TH1} = 0.73V, the STR-F6654 internal comparator 1 starts operating. The STR-F6654 internal oscillator is inverted and the MOSFET turns OFF.

③When the MOSFET turns OFF, charging of STR-F6654 internal capacitor C1 is released and C1 starts discharging by the STR-F6654 internal resistance R1. So, C1 voltage starts falling in accordance with the gradient regulated by the constant discharging time of C1 and R1. So, this means that the fixed time determined by C1 and R1 is the OFF-time of the MOSFET.

④When C1 voltage falls to around 3.7V, the STR-F6654 internal oscillator is reversed again and the MOSFET turns ON. C1 is quickly charged to around 6.5V

The MOSFET continues to oscillate by repeating the above procedure.

5-9-2-3 STR-F6654 protection circuits

overcurrent protection function (OCP)
Overcurrent protection is performed pulse by pulse detecting at STR-F6654 pin 1 (OCP) the peak of the MOSFET drain current in every pulse.

• latch circuit
This circuit sustains an output low from the STR-F6654 internal oscillator and stops operation of the power supply when overvoltage protection (OVP) and thermal shutdown (TSD) circuit are under operation

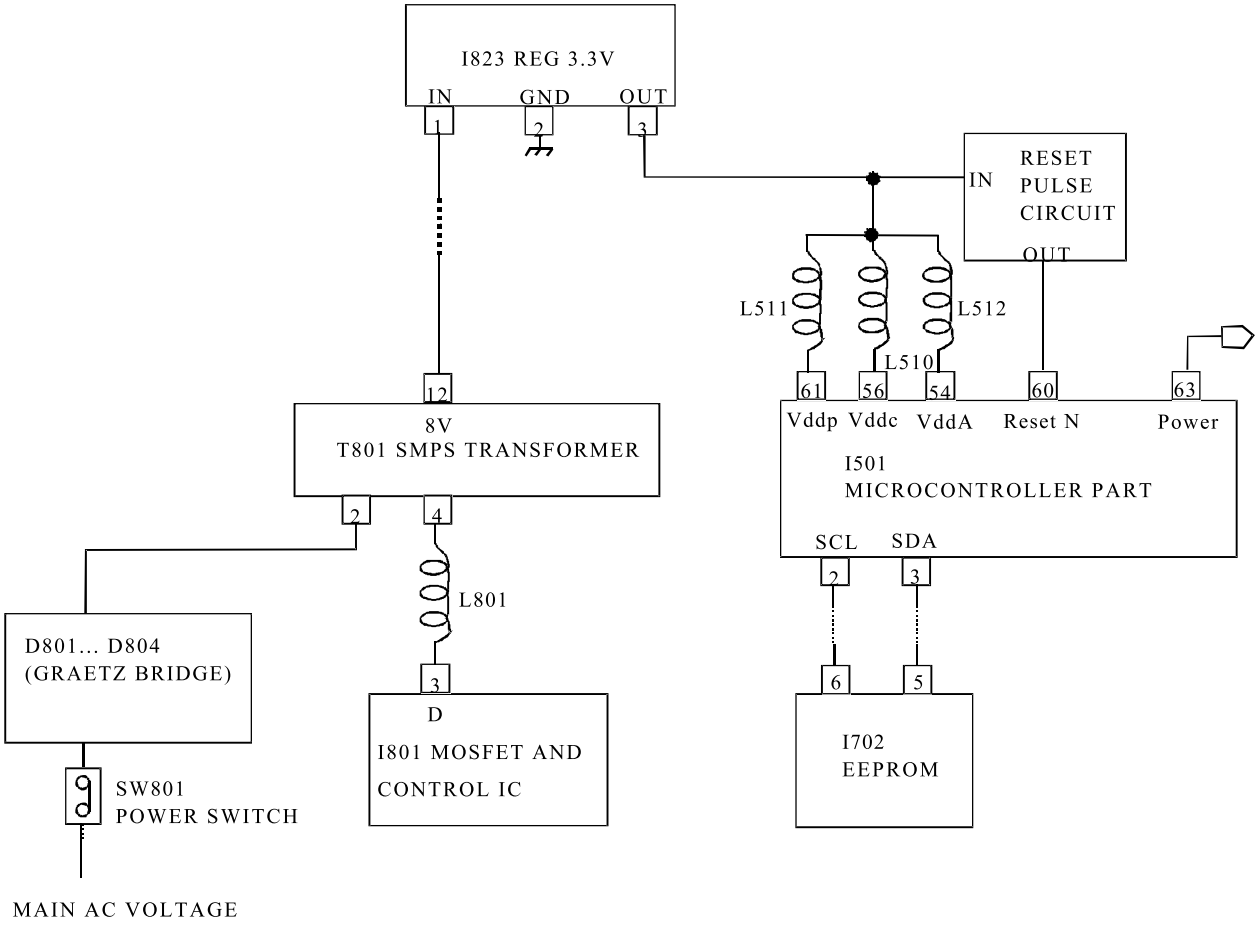
thermal shutdown circuit (TSD)
This circuit triggers the latch circuit when the frame temperature of STR-F6654 IC exceeds 140°C

overvoltage protection circuit (OVP)
This circuit triggers the latch circuit when the V_{in} voltage exceeds 22V (typ.)

5-10 TV start-up, TV normal run and stand by mode operations

5-10-1 TV start-up operations

* Schematic diagram for start-up operations



Start-up operations

* TV start-up and microcontroller initialisation

- When SW801 power switch is pushed, main AC voltage is applied to T801 transformer (after rectification by D801... D804 diodes). Then, T801 SMPS transformer starts operating and supplies DC voltage to I823 (5V regulator).

- This regulator provides 5V / 3.3V DC voltage to I501 microcontroller power supply pins (pin 3 / pin 54) and to the reset pulse circuit which provides reset pulse to I501 microcontroller reset pin (pin 58).

- Then, the microcontroller starts its initialisation. Its power pin (pin 1) is set to high which allows delivery of power supply voltages (123V, 8V, 5V...). At this step, all ICs start working but no picture appears on screen: I501 IC doesn't provide horizontal drive voltage.

- Then, the microcontroller consults I702 EEPROM via I2C bus to know the last TV set mode (normal run mode or stand-by mode) before switching off.

. If the TV set was on normal run mode before switching off, the microcontroller delivers horizontal drive voltage at pin 24 and picture appears on screen.

. If the TV set was on stand-by mode before switching off, the microcontroller switches TV set to stand-by mode, decreasing power pin voltage (pin 1).

5-10-2 TV normal run and stand-by mode operations

Depending on remote control commands, I501 microcontroller part pin 1 (power) is set to :
- high for normal run mode
- low for stand-by mode

a) TV on normal run mode

∗ I501 microcontroller part pin 1 (power) effect

I501 microcontroller part pin 1 (power) is connected to the following circuit :

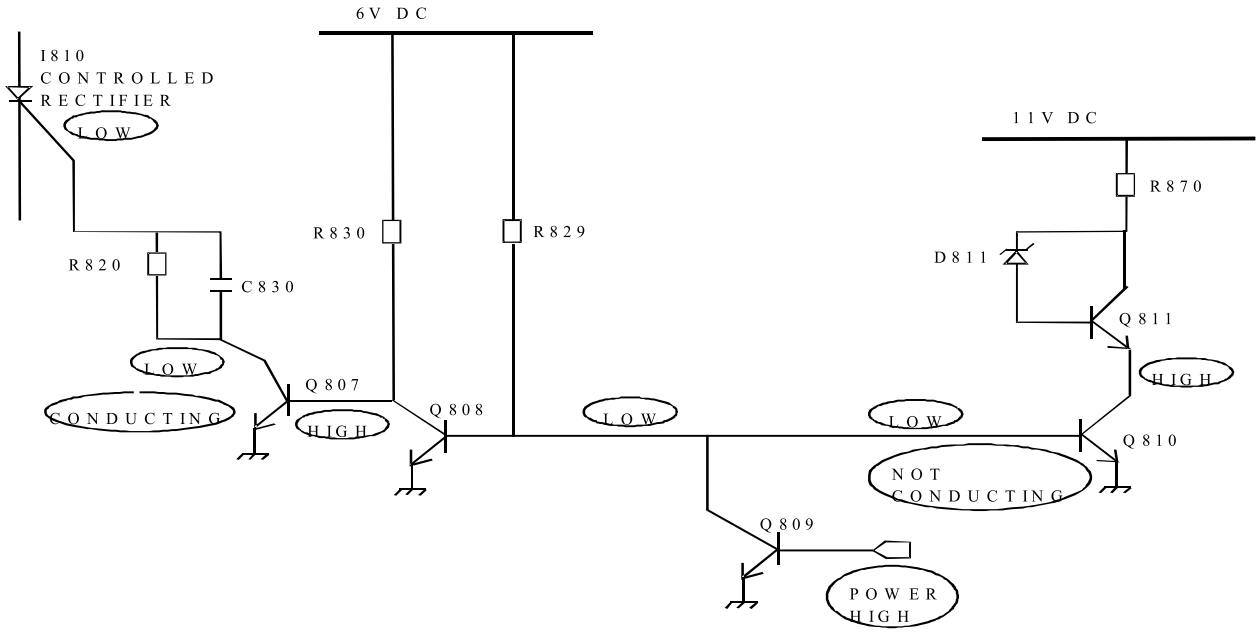


Fig : I501 microcontroller part pin 63 (POWER) effect

On normal run mode, I501 microcontroller pin 1 (power) is set to high

So, I810 controlled rectifier is not conducting

- Q809 is conducting. So, Q808 is not conducting and Q807 is conducting
- So, Q807 collector is connected to the ground and I810 controlled rectifier gate pin is set to low (no conducting)

So, current from 14V DC voltage (from T801 SMPS transformer pin 13) does not flow through Q811 and Q810 transistors but flows through I806 IC error amplifier

- Q809 is conducting. So, Q810 is not conducting and no current flows from Q810 collector to the ground Therefore, the power circuit diagram is the following one :

∗ power supply circuit diagram during TV set normal run

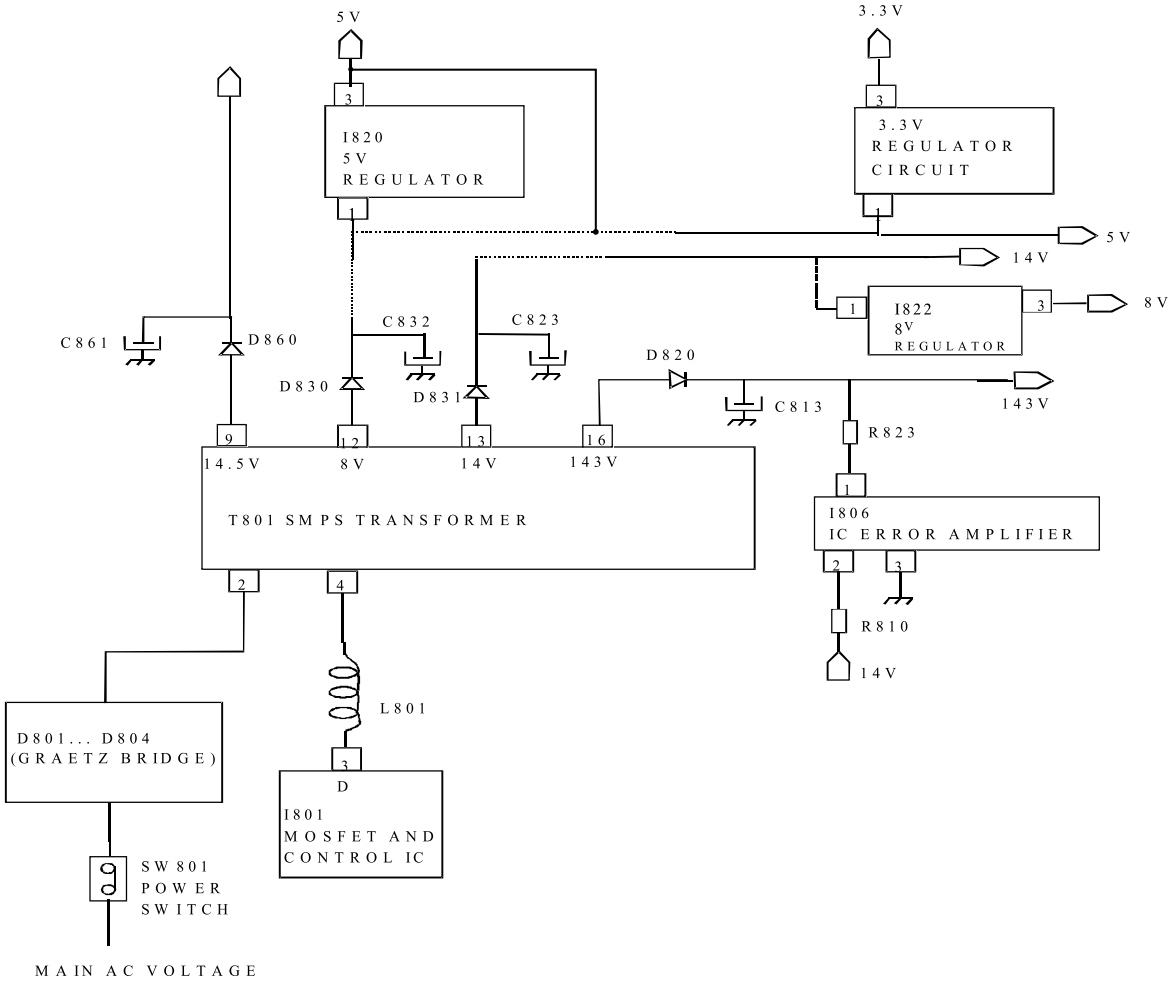


Fig : Power supply operation during TV set normal run

∗ power supply functioning during TV set normal run mode

- I801 transmits controlled pulses to T801 which generates DC voltages after rectifications by secondary part diodes and electro capacitors (by example by D820 and C813 on 143V supply voltage line).

- 8V, 5V, 3.3V supply voltage lines have stabilized voltages obtained by I820, I822, I823 voltage regulators.

- On 143V supply voltage line, R823 resistor has been chosen to reach exact DC voltage required on this line.

- 143V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

∗ power supply IC delivery during TV set normal run

power supply line	IC power supply delivery	Remarks
143V	FBT	FBT supplies 43V to I301 vertical IC FBT supplies 43 V to T401 H- drive for CP785 FBT supplies 12V to I301 vertical IC FBT supplies 33V to the tuner FBT supplies 188V to I901 video amplifier pin 6
14.5V	I602 sound amplifier pins 3-16	
14V	T401 H- drive	
8V	I501 Main IC pins 14-39 I601 Sound Demod pins 38-39-40	
5V	I703 IR receiver pin 1 I501 Main IC pins 3-15-45 I601 Sound Demod pins 7-18-57 I702 EEPROM pin 8 tuner	
3.3V	I501 Main IC pins 25-54	

b) TV set on stand-by mode

* TV set circuit diagram on stand-by mode

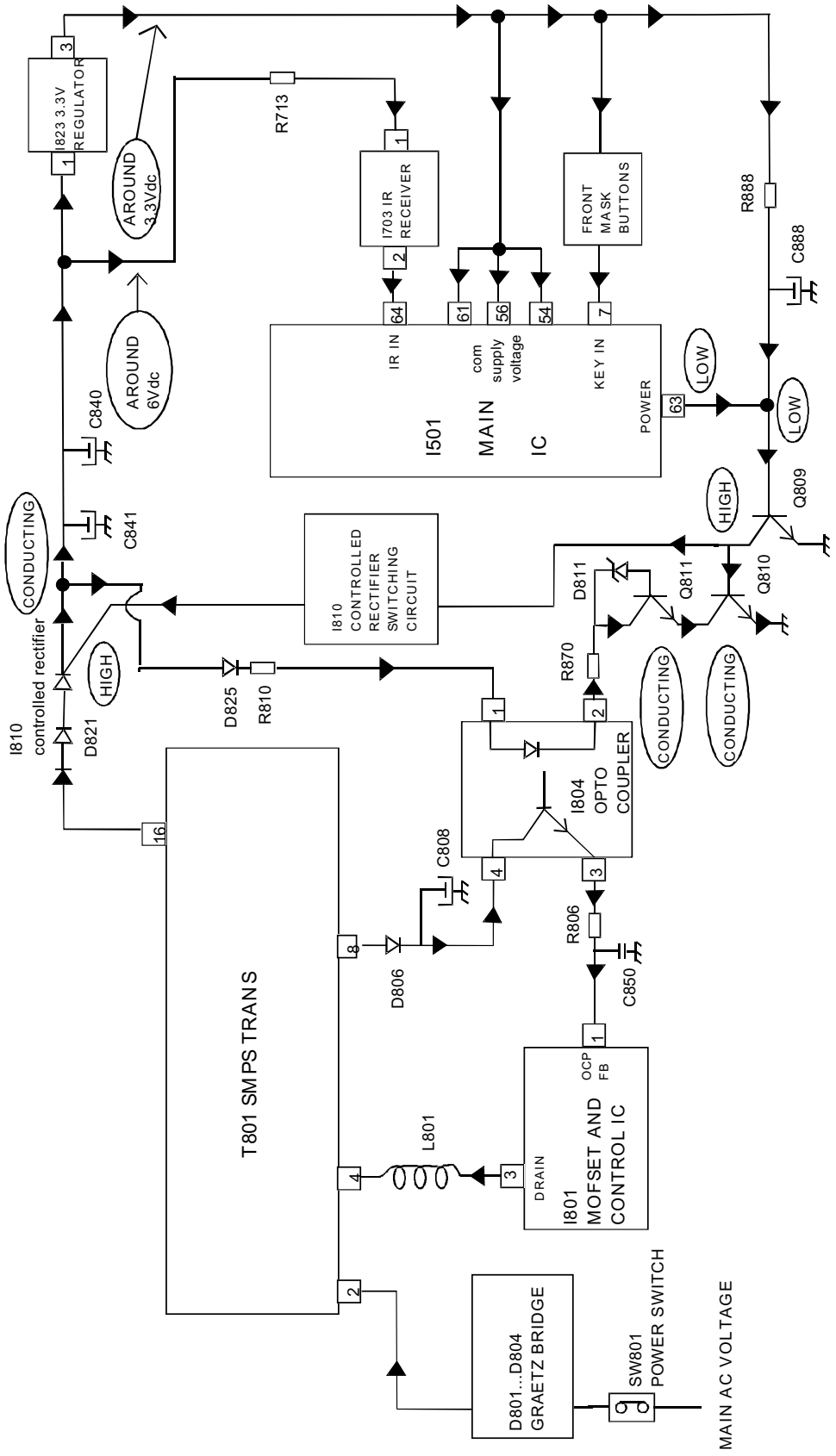


Fig : Power supply operation in stand - by mode

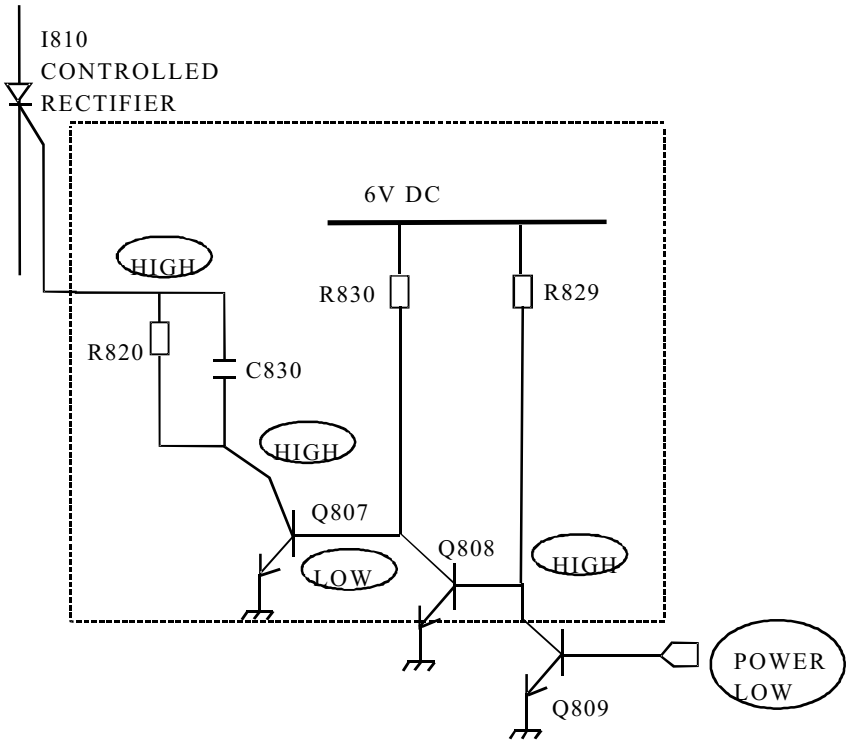


Fig : I810 controlled rectifier switching circuit

* TV set stand-by mode operations

- On stand-by mode, I501 microcontroller pin 1 (power) is set to low.
- So, Q809 collector is set to high.
- Then, I810 controlled rectifier gate pin is set to high and I810 is conducting.
- So, current flows from pin 16 SMPS transformer to the ground via I804 optocoupler and Q810 and Q811 transistors (which are conducting).
- In these conditions, I801 delivers pulses on light mode and T801 produces voltages with reduced power.
- As I810 is conducting, current flows also from pin 16 SMPS transformer to I823 (5V / 3.3V regulator) for I501 μ com, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).

6. Service Parts List

z_loc	z_parts_code	parts_name	parts_descr
ZZ100	48B4846G22	TRANSMITTER REMOCON	R-46G22 (AAA)
ZZ120	PEBCSHD034	COVER BACK AS	DSC-3210E
M211	4952101201	COVER BACK	HIPS
M211E	4857817610	CLOTH BLACK	FELT 300X20X0.7
M211F	4857817630	CLOTH BLACK	FELT 400X20X0.7
ZZ130	PEPKCPD034	PACKING AS	DSC-3210E
M641	6520010100	STAPLE PIN	AUTO W65
M681	4856812400	BAND PP AUTO	T1.1XW17mmXL770M
M801	4958000600	BOX CARTON	DW-4
M811	4958102000	PAD	EPS
M821	4958200700	BAG P.E	FOAM T0.5X1880X1380
ZZ131	58G0000114	COIL DEGAUSSING	DC-3200
ZZ132	49519A0110	CRT GROUND NET	DSC-3210E
ZZ140	PECACAD034	CABINET AS	DSC-3210E
M201A	4956000100	SCREW CRT FIX	SWRM10A L=35
M201B	4856215402	WASHER RUBBER	CR T2.0
M201C	7178301211	SCREW TAPTITE	TT2 WAS 3X12 MFZN
M201D	7178301211	SCREW TAPTITE	TT2 WAS 3X12 MFZN
M201E	7178301211	SCREW TAPTITE	TT2 WAS 3X12 MFZN
M211A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M211B	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M211C	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M211D	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M353	4853526600	HOLDER CORD	NYLON6(DACB-183)
M353A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M481	4954800801	BUTTON POWER	ABS PAINT
M481A	4856716000	SPRING	SWPA PIE0.5
M541	4955400100	SPEC. PLATE	P.E FILM 91.5X63
M561	4955600100	MARK BRAND	AL T1.0 DIA-CUTTING
P402A	4850706S21	CONNECTOR	35135-0620+YLT502+ULW=500
S601	4958301710	SPEAKER	NS 2X3-184-8A
S601A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
S602	4958301710	SPEAKER	NS 2X3-184-8A
S602A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
V901	4959601170	CPT	W76ESF031X13
ZZ200	PEFMSJD034	MASK FRONT AS	DSC-3210E
M201	4952002201	MASK FRONT	HIPS PAINT
M201F	4857817630	CLOTH BLACK	FELT 400X20X0.7
M201G	4857817610	CLOTH BLACK	FELT 300X20X0.7
M371	4853745100	RETA PLATE	PVC T0.5
ZZ290	PEMPMSD034	PCB MAIN MANUAL AS	DSC-3210E
10	2193102005	SOLDER BAR	SN:PB=63:47 S63S-1320
30	2291050616	FLUX SOLDER	JS-64T3
40	2291050301	FLUX SOLVENT	IM-1000
C402	CMYH3C472J	C MYLAR	1.6KV BUP 4700PF J
C403	CMYH3C752J	C MYLAR	1.6KV BUP 7500PF J
C408	CMYE2G304J	C MYLAR	400V PU 0.3MF J
C499	CEYD1H689W	C ELECTRO	50V RHD 6.8MF (16X35.5)
C619	CEXF1E102C	C ELECTRO	25V RUS 1000MF (13X20) TP
C801	CL1UC3474M	C LINE ACROSS	0.47MF 1J(UCVSNDF/SV)+Q/O
C805	CEYN2G181P	C ELECTRO	400V LHS 180MF (25X35)

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C812	CH1BFE472M	C CERA AC	AC400V 4700PF M U/C/V
C813	CEXF2E101V	C ELECTRO	250V RSS 100MF 18X35.5
C840	CEXF1C222V	C ELECTRO	16V RSS 2200MF (16X31.5) TP
C900	CBXB3D102K	C CERA SEMI	2KV BL(N) 1000PF K (T)
D403	DDGP30L—-	DIODE	DGP30L
D404	DRGP30J—-	DIODE	RGP30J
D820	DRGP30J—-	DIODE	RGP30J
D860	DRGP30J—-	DIODE	RGP30J
F801	5FSCB4022R	FUSE CERA	SEMKO F4AH 4A 250V MF51
I101	1TDA4470M-	IC IF	TDA4470-M
I301	1TDA8358J-	IC VERTICAL	TDA8358J
I301A	4857028227	HEAT SINK	AL EX BK
I301B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN
I501	1V3834DW02	IC MICOM	VCT3834A-CA DW02
I501A	4959302910	SOCKET IC	P=1.77 / W=19.05MM
I601	1MSP3410D-	IC AUDIO	MSP3410D
I602	1TDA8946J-	IC AUDIO AMP	TDA8946J
I602A	4857028227	HEAT SINK	AL EX BK
I602B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN
I603	1KA4558—-	IC AMP	KA4558
I702	124LC16B1B	IC MEMORY	24LC16B1B
I801	1STRF6654-	IC SMPS	STR-F6654
I801A	4857027910	HEAT SINK	AL EX
I801B	7174301211	SCREW TAPPTITE	TT2 RND 3X12 MFZN
I804	1LTV817C—	IC PHOTO COUPLER	LTV-817C
I806	1SE130N—-	IC	SE130N
I810	TX0202DA—	THYRISTOR	X0202DA1BA2
I820	1KA7805—-	IC REGULATOR	KA7805
I820A	4857026901	HEAT SINK	AL EX BK
I820B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
I822	1KA7808—-	IC REGULATOR	KA7808
I822A	4857026901	HEAT SINK	AL EX BK
I822B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
I823	1KA7805—-	IC REGULATOR	KA7805
I901	1TDA6107Q-	IC VIDEO AMP	TDA6107Q
I901A	4857031100	HEAT SINK	A1050P-H24 T2.0
I901B	7174301011	SCREW TAPPTITE	TT2 RND 3X10 MFZN
JPA1	4959103680	JACK SCART	DSAM-9408
JPA2	4959103680	JACK SCART	DSAM-9408
L150	58E0000041	COIL AFT	TRF-A005
L380	5MC0000085	COIL CHOKE	CH-100A
L381	5MC0000085	COIL CHOKE	CH-100A
L401	58HD000005	COIL LINEARITY	TRL-60
L402	58C0000127	COIL CHOKE	CH-481A
L802	58C9430599	COIL CHOKE	AZ-9004Y(94MH)
LF801	5PLF24A1—	FILTER LINE	LF-24A1
M351	4953500100	HOLDER CORD	FR HIPS
M351A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK
M352	4853535500	HOLDER CORD	NYLON 66
M361	4953600800	TERMINAL ANT	FR HIPS
M361A	7172401612	SCREW TAPPTITE	TT2 TRS 4X16 MFZN BK

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M361B	7173401212	SCREW TAPPTITE	TT2 BIN 4X12 BK
M381	4953802800	FRAME MAIN PCB	FR HIPS BK
M381A	7178301212	SCREW TAPPTITE	TT2 WAS 3X12 MFZN BK
M682	4856816300	CLAMP WIRE	NYLON 6 (V0)
P102	485923162S	CONN WAFER	YW025-03 (STICK)
P401	4950704023	CONNECTOR	YH025-04+YBNT250-04+ULW=500
P402	4859240120	CONN WAFER	YFW500-06
P501	4950705010	CONNECTOR	YBNH250-05+YBNT250+ULW=500
P701	485923172S	CONN WAFER	YW025-04 (STICK)
P702	485923192S	CONN WAFER	YW025-06 (STICK)
P703	485923162S	CONN WAFER	YW025-03 (STICK)
P801A	4859907410	CORD POWER AS	M5206+TER=2250
M207	4853535500	HOLDER CORD	NYLON 66
M222	4859906111	CORD POWER	M5206+H03VVH2-F=2250
M222T	4857417700	TERM CLAMP	PT-01-T3
P903	4859238620	CONN WAFER	YPW500-02
PA02	485923182S	CONN WAFER	YW025-05 (STICK)
PA03	485923522S	CONN WAFER	YW025-09 (STICK)
Q401	T2SD1880—	TR	2SD1880
Q401A	4857024500	HEAT SINK	AL EX B/K
Q401B	7174300811	SCREW TAPPTITE	TT2 RND 3X8 MFZN
R801	DPC7R0M290	POSISTOR	2322 662 96709
R819	RX10T339J-	R CEMENT	10W 3.3 OHM J TRIPOD
RB10	RV5426103P	R SEMI FIXED	ENV-DJAA03B14 10K OHM B
SCT1	4959300230	SOCKET CRT	4496-S7
SF01	5PK3953M—	FILTER SAW	K3953M
SF02	5PK9650M—	FILTER SAW	K9650M
SP01	485923162S	CONN WAFER	YW025-03 (STICK)
SP02	485923162S	CONN WAFER	YW025-03 (STICK)
T401	50D19A1—-	TRANS DRIVE	TD-19A1
T402	5DH0000025	FBT	1362.5018
T801	50M4936B2-	TRANS SMPS	2094.0057
U100	4859720730	TUNER VARACTOR	UV1316/A
X501	5XE20R250E	CRYSTAL QUARTZ	HC-49/U 20.2500MHZ 30PPM
X601	5XE18R432E	CRYSTAL QUARTZ	HC-49/U 18.43200MHZ 30PPM
Z153	5PYXT5R5MB	FILTER CERA	XT 5.5MB
ZZ200	PEMPJ0D034	PCB MAIN (RHU) AS	DSC-3210E
C106	CEXF1H221V	C ELECTRO	50V RSS 220MF (10X16) TP
C301	CMXB2A224J	C MYLAR	100V EU 0.22MF J (TP)
C315	CEXF2C470C	C ELECTRO	160V RUS 47MF (13X25) TP
C415	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP
C430	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)
C440	CMXE2G273J	C MYLAR	400V PU 0.027MF J (TP)
C502	CEXF1C102V	C ELECTRO	16V RSS 1000MF (10X20) TP
C553	CEXF1C102V	C ELECTRO	16V RSS 1000MF (10X20) TP
C604	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C811	CCXB3D681K	C CERA	2KV B 680PF K (TAPPING)
C814	CEXF2E470V	C ELECTRO	250V RSS 47MF (16X25) TP
C821	CBXB3D102K	C CERA SEMI	2KV BL(N) 1000PF K (T)
C823	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C832	CEXF1E102V	C ELECTRO	25V RSS 1000MF (13X20) TP
C841	CEXF1C332V	C ELECTRO	16V RSS 3300MF (16X25) TP

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C861	CEXF1E102C	C ELECTRO	25V RUS 1000MF (13X20) TP
C910	CEXF2E479V	C ELECTRO	250V RSS 4.7MF (10X16)TP
C997	CEXF2E100V	C ELECTRO	250V RSS 10MF (10X20) TP
ZZ200	PEMPJBD034	PCB MAIN M-10 AS	DSC-3210E
E002	4856310600	EYE LET	BSR T0.2 (R2.3)
E003	4856310600	EYE LET	BSR T0.2 (R2.3)
E004	4856310600	EYE LET	BSR T0.2 (R2.3)
E005	4856310300	EYE LET	BSR T0.2 (R1.6)
E006	4856310300	EYE LET	BSR T0.2 (R1.6)
E007	4856310300	EYE LET	BSR T0.2 (R1.6)
E008	4856310300	EYE LET	BSR T0.2 (R1.6)
E012	4856310600	EYE LET	BSR T0.2 (R2.3)
E013	4856310600	EYE LET	BSR T0.2 (R2.3)
E014	4856310600	EYE LET	BSR T0.2 (R2.3)
E015	4856310600	EYE LET	BSR T0.2 (R2.3)
E016	4856310600	EYE LET	BSR T0.2 (R2.3)
E017	4856310600	EYE LET	BSR T0.2 (R2.3)
E018	4856310300	EYE LET	BSR T0.2 (R1.6)
E021	4856310600	EYE LET	BSR T0.2 (R2.3)
E022	4856310600	EYE LET	BSR T0.2 (R2.3)
E023	4856310300	EYE LET	BSR T0.2 (R1.6)
E024	4856310300	EYE LET	BSR T0.2 (R1.6)
E025	4856310600	EYE LET	BSR T0.2 (R2.3)
E026	4856310600	EYE LET	BSR T0.2 (R2.3)
E027	4856310600	EYE LET	BSR T0.2 (R2.3)
E028	4856310600	EYE LET	BSR T0.2 (R2.3)
E029	4856310600	EYE LET	BSR T0.2 (R2.3)
E030	4856310600	EYE LET	BSR T0.2 (R2.3)
E031	4856310300	EYE LET	BSR T0.2 (R1.6)
E034	4856310300	EYE LET	BSR T0.2 (R1.6)
E035	4856310300	EYE LET	BSR T0.2 (R1.6)
E038	4856310600	EYE LET	BSR T0.2 (R2.3)
E3	4856310300	EYE LET	BSR T0.2 (R1.6)
E36	4856310600	EYE LET	BSR T0.2 (R2.3)
E37	4856310600	EYE LET	BSR T0.2 (R2.3)
E39	4856310300	EYE LET	BSR T0.2 (R1.6)
E4	4856310300	EYE LET	BSR T0.2 (R1.6)
E40	4856310300	EYE LET	BSR T0.2 (R1.6)
E5	4856310300	EYE LET	BSR T0.2 (R1.6)
P801A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P801B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P802A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P802B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P803A	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
P803B	4857417500	TERM PIN	DA-IB0214(D2.3/DY PIN)
R399	RS02Z180JS	R M-OXIDE FILM	2W 18 OHM J SMALL
R406	RS02Z681JS	R M-OXIDE FILM	2W 680 OHM J SMALL
R415	RS02Z102JS	R M-OXIDE FILM	2W 1K OHM J SMALL
R450	RS02Z223JS	R M-OXIDE FILM	2W 22K OHM J SMALL
R802	RS02Z753JS	R M-OXIDE FILM	2W 75K OHM J SMALL
R803	RS02Z473JS	R M-OXIDE FILM	2W 47K OHM J SMALL
R804	RS02Z158J-	R M-OXIDE FILM	2W 0.15 OHM J

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R850	RS02Z129JS	R M-OXIDE FILM	2W 1.2 OHM J SMALL
R906	RF01Z279J-	R FUSIBLE	1W 2.7 OHM J (TAPPING)
ZZ200	PEMPJRD034	PCB MAIN RADIAL AS	DSC-3210E
C102	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C110	CXCH1H150J	C CERA	50V CH 15PF J (TAPPING)
C117	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP
C118	CMXL1J474J	C MYLAR	63V MEU 0.47MF J
C121	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C122	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C152	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C153	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP
C156	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C157	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C158	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C164	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C305	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP
C313	CMXL1J104J	C MYLAR	63V MEU 0.1MF J
C320	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C340	CMXL1J683J	C MYLAR	63V MEU 0.068MF J
C341	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)
C350	CCXF1H103Z	C CERA	50V F 0.01MF Z (TAPPING)
C351	CCXF1H103Z	C CERA	50V F 0.01MF Z (TAPPING)
C370	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)
C401	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP
C412	CEXF2C339V	C ELECTRO	160V RSS 3.3MF (8X16) TP
C418	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)
C420	CCXB2H222K	C CERA	500V B 2200PF K (TAPPING)
C424	CMXM2A333J	C MYLAR	100V 0.033MF J (TP)
C431	CMXM2A103J	C MYLAR	100V 0.01MF J (TP)
C504	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C508	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP
C510	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)
C511	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C513	CCXB1H471K	C CERA	50V B 470PF K (TAPPING)
C519	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C520	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C521	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C522	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C525	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP
C528	CCXF1H223Z	C CERA	50V F 0.022MF Z (TAPPING)
C529	CCXF1H223Z	C CERA	50V F 0.022MF Z (TAPPING)
C530	CCXF1H223Z	C CERA	50V F 0.022MF Z (TAPPING)
C546	CEXF1H339V	C ELECTRO	50V RSS 3.3MF (5X11) TP
C547	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C549	CEXF1H229V	C ELECTRO	50V RSS 2.2MF (5X11) TP
C597	CEXF1H220V	C ELECTRO	50V RSS 22MF (5X11) TP
C601	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)
C602	CEXF1E221V	C ELECTRO	25V RSS 220MF (8X11.5) TP
C603	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)
C605	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C608	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C610	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP

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C611	CEXF1H339V	C ELECTRO	50V RSS 3.3MF (5X11) TP
C612	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C613	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C614	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C615	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C616	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C617	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C620	CXCH1H309C	C CERA	50V CH 3PF C
C621	CXCH1H309C	C CERA	50V CH 3PF C
C622	CXCH1H680J	C CERA	50V CH 68PF J (TAPPING)
C623	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C624	CEXF1H109V	C ELECTRO	50V RSS 1MF (5X11) TP
C625	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP
C626	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP
C627	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C628	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C629	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C630	CEXF1E470V	C ELECTRO	25V RSS 47MF (5X11) TP
C632	CEXF1E479A	C ELECTRO	25V RSM 4.7MF
C633	CEXF1E479A	C ELECTRO	25V RSM 4.7MF
C634	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C635	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)
C636	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C641	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP
C642	CEXF1H101V	C ELECTRO	50V RSS 100MF (8X11.5) TP
C660	CEXF1C100A	C ELECTRO	16V RSM 10MF 5X7
C661	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C662	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C665	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)
C666	CBXF1H104Z	C CERA SEMI	50V F 0.1MF Z (TAPPING)
C667	CCXB1H472K	C CERA	50V B 4700PF K (TAPPING)
C668	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C669	CMXL1J224J	C MYLAR	63V MEU 0.22MF J (TP)
C688	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C689	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C690	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)
C691	CMXM2A104J	C MYLAR	100V 0.1MF J (TP)
C692	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C693	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C770	CEXF1C101V	C ELECTRO	16V RSS 100MF (6.3X11) TP
C803	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)
C804	CCXF3A472Z	C CERA	1KV F 4700PF Z (T)
C806	CEXF1H330V	C ELECTRO	50V RSS 33MF (6.3X11) TP
C807	CCXF1H473Z	C CERA	50V F 0.047MF Z (TAPPING)
C808	CEXF1H479V	C ELECTRO	50V RSS 4.7MF (5X11) TP
C809	CCXB1H102K	C CERA	50V B 1000PF K (TAPPING)
C820	CCXB3A471K	C CERA	1KV B 470PF K (T)
C824	CCXB3A471K	C CERA	1KV B 470PF K (T)
C831	CCXB3A471K	C CERA	1KV B 470PF K (T)
C835	CEXF1H470V	C ELECTRO	50V RSS 47MF (6.3X11) TP
C844	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C850	CCXB1H821K	C CERA	50V B 820PF K (TAPPING)

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C863	CEXF1E101V	C ELECTRO	25V RSS 100MF (6.3X11) TP
C866	CCXB3A471K	C CERA	1KV B 470PF K (T)
C888	CEXF1C470V	C ELECTRO	16V RSS 47MF (5X11) TP
C902	CMXL2E104K	C MYLAR	250V MEU 0.1MF K
F801A	4857415001	CLIP FUSE	PFC5000-0702
F801B	4857415001	CLIP FUSE	PFC5000-0702
G900	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP
G901	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP
G902	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP
G903	4SG0DX0001	SPARK GAP	SSG-102-A1(1.0KV) TAP
L101	5CPX479J—	COIL PEAKING	4.7UH J (RADIAL)
Q103	TKTC3198Y-	TR	KTC3198Y
Q104	TKTC3198Y-	TR	KTC3198Y
Q120	TKTC3198Y-	TR	KTC3198Y
Q150	TKTC3198Y-	TR	KTC3198Y
Q151	TKTC3198Y-	TR	KTC3198Y
Q333	TKTC3198Y-	TR	KTC3198Y
Q334	TKTC3198Y-	TR	KTC3198Y
Q402	T2SD1207T-	TR	2SD1207-T (TAPPING)
Q510	TKTC3198Y-	TR	KTC3198Y
Q511	TKTC3198Y-	TR	KTC3198Y
Q542	TKTA1266Y-	TR	KTA1266Y (TP)
Q543	TKTA1266Y-	TR	KTA1266Y (TP)
Q544	TKTA1266Y-	TR	KTA1266Y (TP)
Q550	TKTC3198Y-	TR	KTC3198Y
Q599	TKTA1266Y-	TR	KTA1266Y (TP)
Q601	TKTA1266Y-	TR	KTA1266Y (TP)
Q691	TKTC3198Y-	TR	KTC3198Y
Q692	TKTC3198Y-	TR	KTC3198Y
Q701	TKTC3198Y-	TR	KTC3198Y
Q702	TKTA1266Y-	TR	KTA1266Y (TP)
Q807	TKTC3198Y-	TR	KTC3198Y
Q808	TKTC3198Y-	TR	KTC3198Y
Q809	TKTC3198Y-	TR	KTC3198Y
Q810	TKTC3198Y-	TR	KTC3198Y
Q811	TKTC3198Y-	TR	KTC3198Y
Q850	TKTC3198Y-	TR	KTC3198Y
Q851	TKTC3198Y-	TR	KTC3198Y
QA01	TKTC3198Y-	TR	KTC3198Y
Z603	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z604	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z605	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z606	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z607	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
Z608	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
ZZ200	PEMPJAD034	PCB MAIN AXIAL AS	DSC-3210E
A001	4959809424	PCB MAIN	330 X 246
C101	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C103	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C104	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C116	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C119	CCZF1H103Z	C CERA	50V F 0.01MF Z

z_loc	z_parts_code	parts_name	parts_descr
C120	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C151	CCZF1H103Z	C CERA	50V F 0.01MF Z
C154	CCZF1H103Z	C CERA	50V F 0.01MF Z
C160	CCZF1H103Z	C CERA	50V F 0.01MF Z
C161	CZCH1H220J	C CERA	50V CH 22PF J (AXIAL)
C163	CCZF1H103Z	C CERA	50V F 0.01MF Z
C500	CCZF1H103Z	C CERA	50V F 0.01MF Z
C501	CCZF1H103Z	C CERA	50V F 0.01MF Z
C503	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C505	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C506	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C507	CCZF1H103Z	C CERA	50V F 0.01MF Z
C509	CCZF1H103Z	C CERA	50V F 0.01MF Z
C512	CCZF1H103Z	C CERA	50V F 0.01MF Z
C516	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C526	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C527	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C534	CCZF1H333Z	C CERA	50V F 0.033MF Z
C535	CCZF1H333Z	C CERA	50V F 0.033MF Z
C536	CCZF1H333Z	C CERA	50V F 0.033MF Z
C548	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C554	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C555	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C560	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C561	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C568	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C571	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C578	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C579	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C581	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C585	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
C587	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C589	CCZB1H221K	C CERA	50V B 220PF K (AXIAL)
C590	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C591	CZCH1H309C	C CERA	50V CH 3PF C (AXIAL)
C606	CCZF1H103Z	C CERA	50V F 0.01MF Z
C607	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C618	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
C631	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
C637	CCZF1H103Z	C CERA	50V F 0.01MF Z
C650	CZCH1H680J	C CERA	CH 50V 68PF J AXL 52MM
C830	CBZF1H104Z	C CERA SEMI	50V F 0.1MF Z
CA01	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA02	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA03	CCZB1H101K	C CERA	50V B 100PF K (AXIAL)
CA04	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA07	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA08	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA10	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA13	CCZB1H471K	C CERA	50V B 470PF K (AXIAL)
CA14	CCZB1H471K	C CERA	50V B 470PF K (AXIAL)
CA15	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)

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CA16	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA17	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
CA18	CCZB1H102K	C CERA	50V B 1000PF K (AXIAL)
D100	DUZ33B——	DIODE ZENER	UZ-33B
D101	D1N4148—-	DIODE	1N4148 (TAPPING)
D103	DBA282——	DIODE	BA282
D313	DRGP15J—-	DIODE	RGP15J
D360	DUZ22BM—-	DIODE ZENER	UZ-22BM
D361	DUZ33B——	DIODE ZENER	UZ-33B
D362	DUZ33B——	DIODE ZENER	UZ-33B
D367	DUZ33B——	DIODE ZENER	UZ-33B
D405	DRGP15J—-	DIODE	RGP15J
D407	DRGP15J—-	DIODE	RGP15J
D408	DRGP15J—-	DIODE	RGP15J
D410	D1N4004S—	DIODE	1N4004S
D411	D1N4004S—	DIODE	1N4004S
D450	DRGP15J—-	DIODE	RGP15J
D520	D1N4148—-	DIODE	1N4148 (TAPPING)
D521	D1N4148—-	DIODE	1N4148 (TAPPING)
D533	D1N4148—-	DIODE	1N4148 (TAPPING)
D534	D1N4148—-	DIODE	1N4148 (TAPPING)
D537	D1N4148—-	DIODE	1N4148 (TAPPING)
D550	D1N4148—-	DIODE	1N4148 (TAPPING)
D551	D1N4148—-	DIODE	1N4148 (TAPPING)
D591	DUZ2R7B—-	DIODE ZENER	UZ-2.7B
D597	D1N4148—-	DIODE	1N4148 (TAPPING)
D598	D1N4148—-	DIODE	1N4148 (TAPPING)
D599	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D601	D1N4148—-	DIODE	1N4148 (TAPPING)
D602	D1N4148—-	DIODE	1N4148 (TAPPING)
D603	D1N4148—-	DIODE	1N4148 (TAPPING)
D604	D1N4148—-	DIODE	1N4148 (TAPPING)
D801	DLT2A05G—	DIODE	LT2A05G (TP)
D802	DLT2A05G—	DIODE	LT2A05G (TP)
D803	DLT2A05G—	DIODE	LT2A05G (TP)
D804	DLT2A05G—	DIODE	LT2A05G (TP)
D805	DRGP15J—-	DIODE	RGP15J
D806	DRGP15J—-	DIODE	RGP15J
D808	DRGP15J—-	DIODE	RGP15J
D809	DRGP15J—-	DIODE	RGP15J
D811	DUZ6R2BM—	DIODE ZENER	UZ-6.2BM
D821	DRGP15J—-	DIODE	RGP15J
D824	D1N4148—-	DIODE	1N4148 (TAPPING)
D825	D1N4148—-	DIODE	1N4148 (TAPPING)
D830	DRGP15J—-	DIODE	RGP15J
D831	DRGP15J—-	DIODE	RGP15J
D840	D1N4148—-	DIODE	1N4148 (TAPPING)
D841	D1N4148—-	DIODE	1N4148 (TAPPING)
D850	DUZ2R7B—-	DIODE ZENER	UZ-2.7B
D911	D1N4004S—	DIODE	1N4004S
D912	D1N4004S—	DIODE	1N4004S
D913	D1N4004S—	DIODE	1N4004S

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D997	DLT2A05G—	DIODE	LT2A05G (TP)
DA03	DUZ5R1BM—	DIODE ZENER	UZ-5.1BM
DA06	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA07	DUZ5R1BM—	DIODE ZENER	UZ-5.1BM
DA08	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA09	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA10	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA11	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA15	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA16	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA27	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
DA32	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
J002	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J003	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J005	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J006	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J007	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J008	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J009	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J018	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J019	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J022	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J023	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J024	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J025	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J036	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J038	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J046	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J047	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J053	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J054	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J056	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J061	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J065	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J070	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J072	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J073	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J075	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J076	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J079	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J080	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J082	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J088	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J100	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J101	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J120	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J124	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J153	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J166	RD-AZ229J-	R CARBON FILM	1/6 2.2 OHM J
J234	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J801	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J802	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING

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J803	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J826	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J827	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J828	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J829	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J833	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J835	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J836	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J840	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J841	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J844	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J845	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J846	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J853	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J858	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J859	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J860	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J867	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J873	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J874	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J876	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J878	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J880	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J883	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J885	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J887	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J889	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J896	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J903	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J909	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J912	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J914	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J915	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J916	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J917	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J918	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J919	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J920	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J925	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J927	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J928	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J929	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J930	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J931	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J932	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J933	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
J934	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
L105	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L153	5CPZ120K02	COIL PEAKING	12UH K (AXIAL 3.5MM)
L501	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L502	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L503	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)

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L504	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L601	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L602	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L605	5CPZ479K02	COIL PEAKING	4.7UH K (AXIAL 3.5MM)
L650	5MC0000100	COIL BEAD	HC-3550
L801	5MC0000100	COIL BEAD	HC-3550
LA01	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA02	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA03	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
LA04	5CPZ100K04	COIL PEAKING	10UH 10.5MM K (LAL04TB)
R101	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R103	RD-AZ123J-	R CARBON FILM	1/6 12K OHM J
R104	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R105	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R106	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J
R107	RD-AZ561J-	R CARBON FILM	1/6 560 OHM J
R110	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R111	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R116	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R117	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R118	RD-AZ151J-	R CARBON FILM	1/6 150 OHM J
R120	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R131	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R151	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R152	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R153	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J
R154	RD-AZ470J-	R CARBON FILM	1/6 47 OHM J
R155	RD-AZ751J-	R CARBON FILM	1/6 750 OHM J
R160	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R161	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R162	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J
R163	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R164	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R177	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J
R190	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R191	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J
R301	RD-4Z472J-	R CARBON FILM	1/4 4.7K OHM J
R310	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J
R311	RD-AZ392J-	R CARBON FILM	1/6 3.9K OHM J
R330	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J
R331	RD-2Z201J-	R CARBON FILM	1/2 200 OHM J
R333	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R334	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R340	RD-4Z334J-	R CARBON FILM	1/4 330K OHM J
R341	RD-4Z333J-	R CARBON FILM	1/4 33K OHM J
R350	RD-4Z272J-	R CARBON FILM	1/4 2.7K OHM J
R351	RD-4Z272J-	R CARBON FILM	1/4 2.7K OHM J
R370	RD-4Z159J-	R CARBON FILM	1/4 1.5 OHM J
R394	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R395	RD-4Z394J-	R CARBON FILM	1/4 390K OHM J
R396	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R397	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J

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R398	RD-2Z109J-	R CARBON FILM	1/2 1 OHM J
R401	RD-4Z272J-	R CARBON FILM	1/4 2.7K OHM J
R402	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J
R404	RD-2Z399J-	R CARBON FILM	1/2 3.9 OHM J
R420	RD-2Z152J-	R CARBON FILM	1/2 1.5K OHM J
R444	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
R500	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R501	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R502	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R503	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R504	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R506	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R507	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J
R508	RD-AZ562J-	R CARBON FILM	1/6 5.6K OHM J
R509	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R511	RD-AZ133J-	R CARBON FILM	1/6 13K OHM J
R512	RD-AZ133J-	R CARBON FILM	1/6 13K OHM J
R513	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
R517	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R518	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R530	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R532	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R533	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R535	RD-AZ201J-	R CARBON FILM	1/6 200 OHM J
R537	RD-AZ201J-	R CARBON FILM	1/6 200 OHM J
R540	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R541	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J
R542	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R543	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R544	RD-AZ202J-	R CARBON FILM	1/6 2K OHM J
R548	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R550	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R555	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R560	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R561	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R562	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R563	RD-AZ152J-	R CARBON FILM	1/6 1.5K OHM J
R566	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
R568	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R569	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R570	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R572	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R573	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R576	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R577	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R578	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R579	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R580	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R582	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R583	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R586	RD-AZ271J-	R CARBON FILM	1/6 270 OHM J
R587	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J

z_loc	z_parts_code	parts_name	parts_descr
R588	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R589	RD-AZ330J-	R CARBON FILM	1/6 33 OHM J
R590	RD-4Z473J-	R CARBON FILM	1/4 47K OHM J
R591	RD-AZ431J-	R CARBON FILM	1/6 430 OHM J
R592	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R593	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R594	RD-AZ222J-	R CARBON FILM	1/6 2.2K OHM J
R595	RD-AZ682J-	R CARBON FILM	1/6 6.8K OHM J
R596	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R597	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J
R598	RD-AZ153J-	R CARBON FILM	1/6 15K OHM J
R599	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R601	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R602	RD-AZ104J-	R CARBON FILM	1/6 100K OHM J
R603	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R604	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R605	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R606	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R607	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R610	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R611	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R612	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
R613	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J
R614	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R615	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R616	RD-4Z220J-	R CARBON FILM	1/4 22 OHM J
R617	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R620	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R621	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R622	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R641	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R642	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R646	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R647	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R649	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R650	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R651	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R652	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R660	RD-AZ752J-	R CARBON FILM	1/6 7.5K OHM J
R661	RD-AZ912J-	R CARBON FILM	1/6 9.1K OHM J
R662	RD-AZ912J-	R CARBON FILM	1/6 9.1K OHM J
R688	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J
R689	RD-AZ183J-	R CARBON FILM	1/6 18K OHM J
R690	RD-2Z229J-	R CARBON FILM	1/2 2.2 OHM J
R691	RD-2Z229J-	R CARBON FILM	1/2 2.2 OHM J
R692	RD-AZ124J-	R CARBON FILM	1/6 120K OHM J
R693	RD-AZ124J-	R CARBON FILM	1/6 120K OHM J
R694	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R695	RD-AZ124J-	R CARBON FILM	1/6 120K OHM J
R696	RD-AZ124J-	R CARBON FILM	1/6 120K OHM J
R697	RD-AZ272J-	R CARBON FILM	1/6 2.7K OHM J
R700	RD-2Z332J-	R CARBON FILM	1/2 3.3K OHM J

z_loc	z_parts_code	parts_name	parts_descr
R709	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R710	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R711	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R712	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R713	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J
R720	RD-AZ122J-	R CARBON FILM	1/6 1.2K OHM J
R805	RD-2Z100J-	R CARBON FILM	1/2 10 OHM J
R806	RD-2Z472J-	R CARBON FILM	1/2 4.7K OHM J
R807	RD-2Z272J-	R CARBON FILM	1/2 2.7K OHM J
R808	RD-2Z821J-	R CARBON FILM	1/2 820 OHM J
R810	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J
R811	RC-2Z565KP	R CARBON COMP	1/2 5.6M OHM K
R817	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
R820	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R821	RD-4Z102J-	R CARBON FILM	1/4 1K OHM J
R823	RD-2Z392J-	R CARBON FILM	1/2 3.9K OHM J
R829	RD-AZ103J-	R CARBON FILM	1/6 10K OHM J
R830	RD-AZ332J-	R CARBON FILM	1/6 3.3K OHM J
R841	RD-2Z470J-	R CARBON FILM	1/2 47 OHM J
R851	RD-AZ391J-	R CARBON FILM	1/6 390 OHM J
R852	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
R855	RD-4Z335J-	R CARBON FILM	1/4 3.3M OHM J
R870	RD-2Z222J-	R CARBON FILM	1/2 2.2K OHM J
R901	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R902	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R903	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R910	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R911	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R912	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R913	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
R921	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
R922	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
R923	RC-2Z102K-	R CARBON COMP	1/2 1K OHM K
R983	RD-4Z472J-	R CARBON FILM	1/4 4.7K OHM J
R996	RD-2Z105J-	R CARBON FILM	1/2 1M OHM J
R997	RD-2Z102J-	R CARBON FILM	1/2 1K OHM J
RA01	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
RA02	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA03	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA04	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA05	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J
RA06	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA07	RD-AZ333J-	R CARBON FILM	1/6 33K OHM J
RA08	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA09	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA10	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA11	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA12	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA13	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J
RA14	RD-AZ101J-	R CARBON FILM	1/6 100 OHM J
RA15	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA16	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J

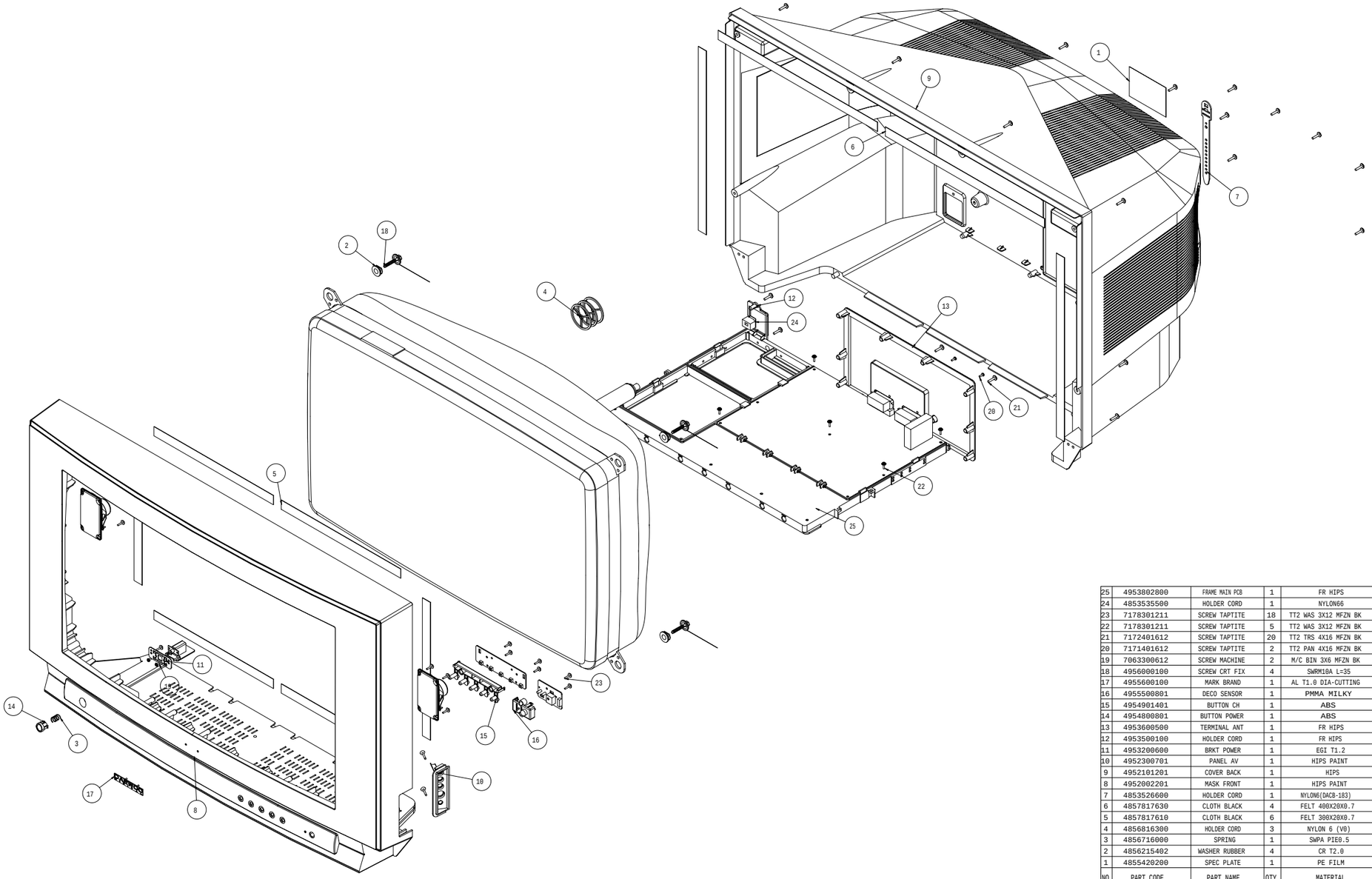
z_loc	z_parts_code	parts_name	parts_descr
RA17	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA19	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
RA29	RD-AZ102J-	R CARBON FILM	1/6 1K OHM J
RA32	RD-AZ680J-	R CARBON FILM	1/6 68 OHM J
RA44	RD-AZ113J-	R CARBON FILM	1/6 11K OHM J
RA90	RD-AZ220J-	R CARBON FILM	1/6 22 OHM J
RA91	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J
RA92	RD-AZ223J-	R CARBON FILM	1/6 22K OHM J
ZZ300	PEUNSWD034	PCB UNION AS	DSC-3210E
10	2193102005	SOLDER BAR	SN:PB=63:47 S63S-1320
30	2291050616	FLUX SOLDER	JS-64T3
40	2291050301	FLUX SOLVENT	IM-1000
D707	DH1L25RGD-	LED (R,G-3 COLOR)	HI-L25RGD
I703	1SR9HP——	IC PREAMP	SR-9HP
I901	1MM1118—-	IC A/V SWITCH	MM1118
JZ1	4859105240	JACK PHONE	LGT1516-0100
JZ2	4859105340	JACK S-VHS	YKF51-5359
JZ3	4859105450	JACK PIN BOARD	YSC03P-4120-9S
M232	4952300701	PANEL AV	HIPS PAINT
M232A	7178301211	SCREW TAPTITE	TT2 WAS 3X12 MFZN
M321	4953200600	BRKT POWER	EGI T1.2
M321A	7063300612	SCREW MACHINE	M/C BIN 3X6 MFZN BK
M491	4954901401	BUTT0N CH	ABS PAINT
M551	4955500801	DECO SENSOR	PMMA MILKY
P02	4950705011	CONNECTOR	YH025-05+YST250+ULW=600
P03	4950709012	CONNECTOR	YH025-09+YST250+USW=600
P702A	4950706023	CONNECTOR	YH025-06+YST250+ULW=500
P703A	4950703023	CONNECTOR	YH025-03+YST250+ULW=500
PS801	4950702011	CONNECTOR	YFH800-02+YDT236+ULW=500
SW801	5S40000003	SW POWER PUSH	SS-160-7-G
ZZ200	PEUNJRD034	PCB UNION RADIAL AS	DSC-3210E
C901	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C902	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
C903	CCXF1H103Z	C CERA	50V F 0.01MF Z (TAPPING)
C904	CEXF1H100V	C ELECTRO	50V RSS 10MF (5X11) TP
F01	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
F02	5PXF1B471M	FILTER EMI	CFI 06 B 1H 470PF
SW700	5S50101Z90	SW TACT	THVV502GDA
SW701	5S50101Z90	SW TACT	THVV502GDA
SW702	5S50101Z90	SW TACT	THVV502GDA
SW703	5S50101Z90	SW TACT	THVV502GDA
SW704	5S50101Z90	SW TACT	THVV502GDA
ZZ200	PEUNJAD034	PCB UNION AXIAL AS	DSC-3210E
A001	4959809524	PCB UNION	270 X 246
D901	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
D902	DUZ5R6BM—	DIODE ZENER	UZ-5.6BM
J011	85801065GY	WIRE COPPER	AWG22 1/0.65 TIN COATING
R721	RD-AZ181J-	R CARBON FILM	1/6 180 OHM J
R722	RD-AZ221J-	R CARBON FILM	1/6 220 OHM J
R723	RD-AZ331J-	R CARBON FILM	1/6 330 OHM J
R724	RD-AZ471J-	R CARBON FILM	1/6 470 OHM J
R901	RD-AZ473J-	R CARBON FILM	1/6 47K OHM J

z_loc	z_parts_code	parts_name	parts_descr
R902	RD-AZ472J-	R CARBON FILM	1/6 4.7K OHM J
R903	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J
R904	RD-AZ750J-	R CARBON FILM	1/6 75 OHM J

z_loc	z_parts_code	parts_name	parts_descr

7- Explode View

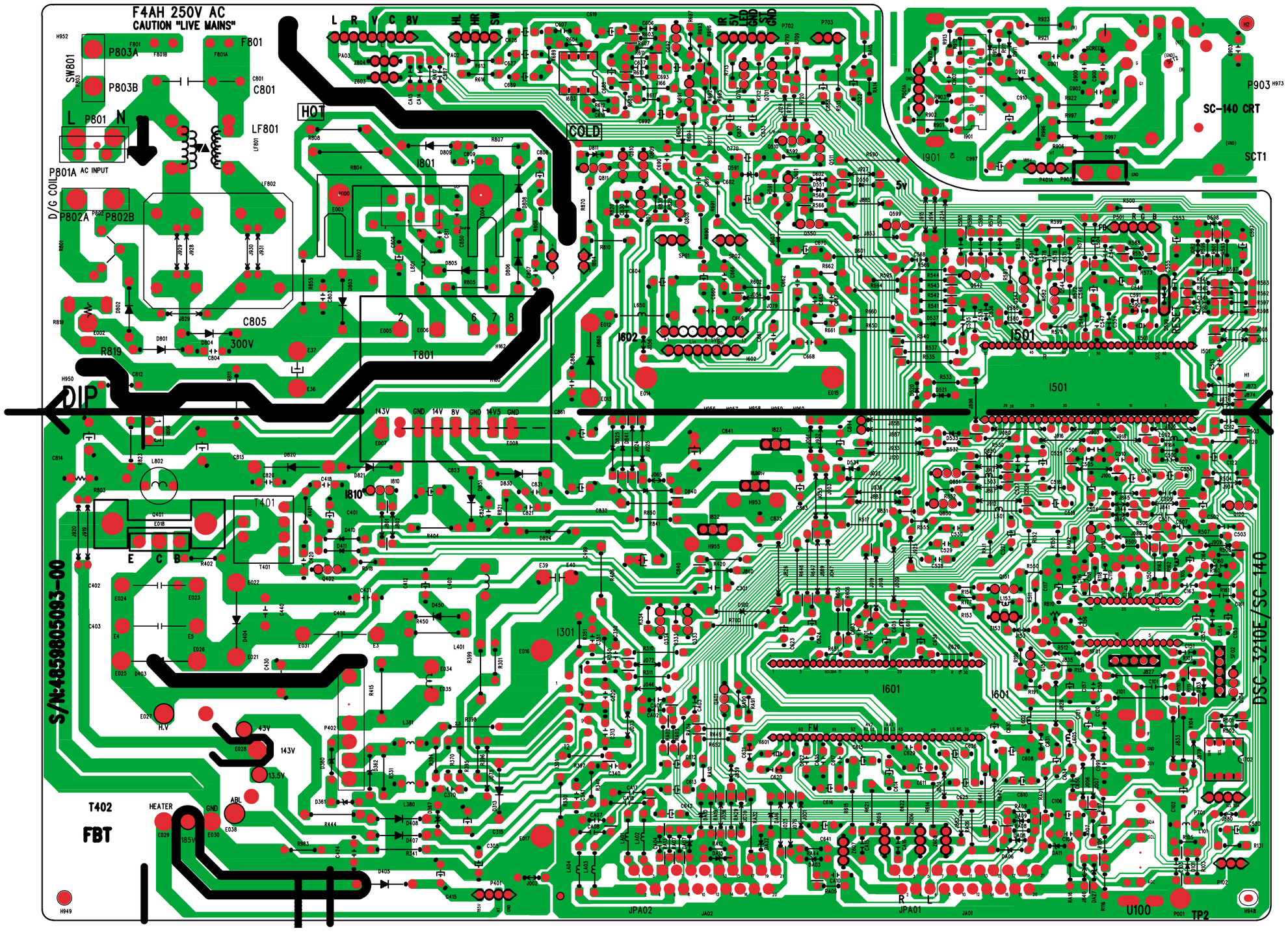
REV	LIST OF MODIFICATION	REASON OF MODIFICATION	DATE	NAME	APPR
1					
2					



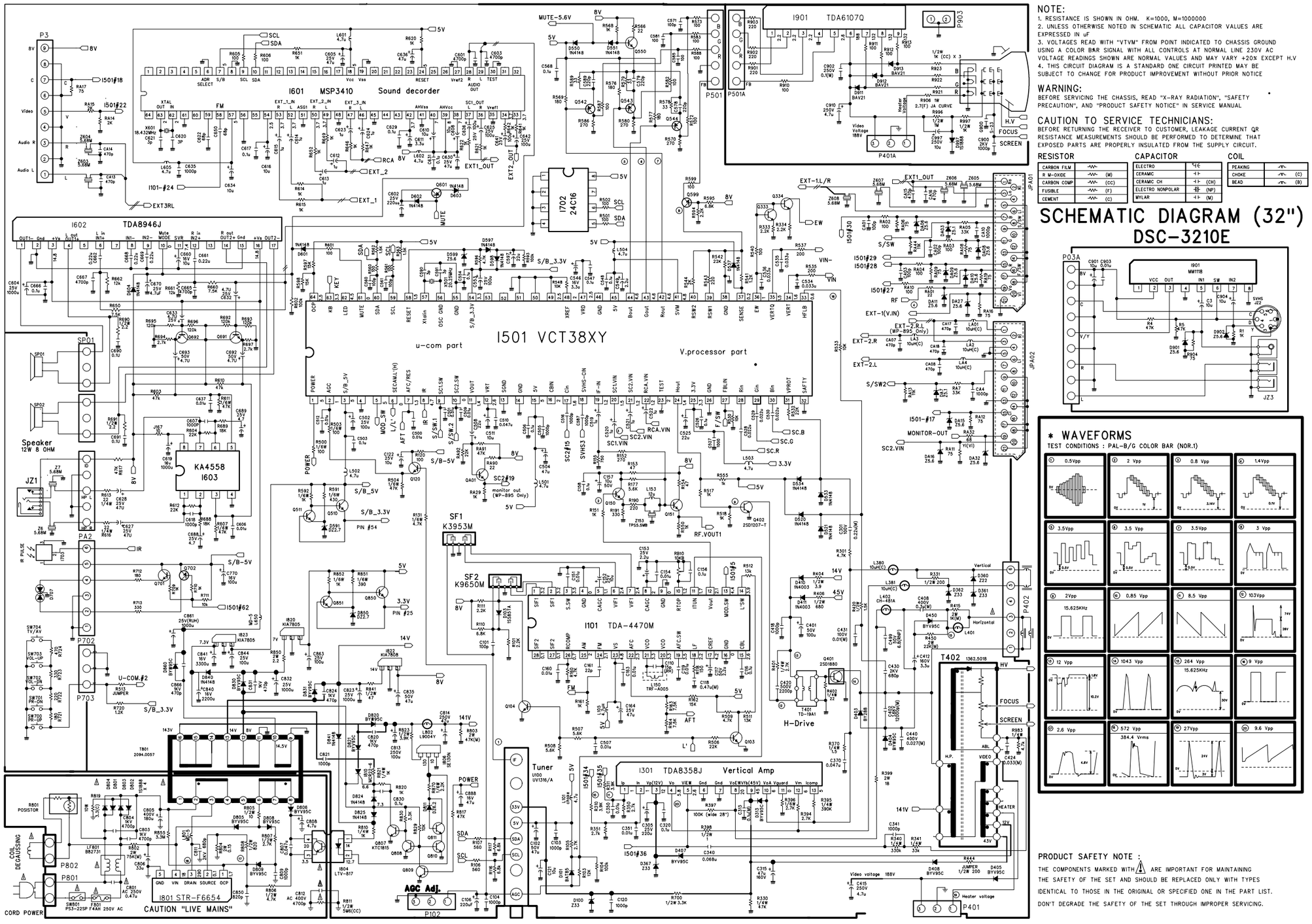
NO	PART CODE	PART NAME	QTY	MATERIAL	REMARKS
25	4953802800	FRAME MAIN PCB	1	FR HIPS	
24	4853535500	HOLDER CORD	1	NYLON66	
23	7178301211	SCREW TAPTITE	18	TT2 WAS 3X12 MFZN BK	
22	7178301211	SCREW TAPTITE	5	TT2 WAS 3X12 MFZN BK	
21	7172401612	SCREW TAPTITE	20	TT2 TRS 4X16 MFZN BK	
20	7171401612	SCREW TAPTITE	2	TT2 PAN 4X16 MFZN BK	
19	7063300612	SCREW MACHINE	2	M/C BIN 3X6 MFZN BK	
18	4956000100	SCREW CRT FIX	4	SWRM10A L=35	
17	4955600100	MARK BRAND	1	AL T1.0 DIA-CUTTING	
16	4955500801	DECO SENSOR	1	PMMA MILKY	
15	4954901401	BUTTON CH	1	ABS	
14	4954800801	BUTTON POWER	1	ABS	
13	4953600500	TERMINAL ANT	1	FR HIPS	
12	4953500100	HOLDER CORD	1	FR HIPS	
11	4953200600	BRKT POWER	1	EGI T1.2	
10	4952300701	PANEL AV	1	HIPS PAINT	
9	4952101201	COVER BACK	1	HIPS	
8	4952002201	MASK FRONT	1	HIPS PAINT	
7	4853526600	HOLDER CORD	1	NYLON6(DAC8-183)	
6	4857817630	CLOTH BLACK	4	FELT 400X20X0.7	
5	4857817610	CLOTH BLACK	6	FELT 300X20X0.7	
4	4856816300	HOLDER CORD	3	NYLON 6 (V0)	
3	4856716000	SPRING	1	SWPA PIE0.5	
2	4856215402	WASHER RUBBER	4	CR T2.0	
1	4855420200	SPEC PLATE	1	PE FILM	

UNITS	mm	Designed by	Checked by	Inspected by	Approved by	PART NAME	
		HJLEE	HJLEE	BKCHOI	BKCHOI		
SCALE	0.3	02.02.15	02.02.15	02.02.15	02.02.15	EXPLODED VIEW	(1/1)
Daewoo Electronics CO.,LTD. Digital TV Research Center				MODEL	DSC-3210E	D/N	49500029
				REFERENCE			

8- PCB Layout


F4AH 250V AC
CAUTION "LIVE MAINS"
SW801
P803A
P803B
F801
C801
LF801
L P801 N
P801A AC INPUT
D/G COIL
P802A P802B
HOT
COLD
I801
C805
300V
R819
T801
DIP
143V
GND 14V 8V GND 14V5 GND
I810
T401
E B C
T402
FBT
HEATER
GND
ABL
185V
H.V
43V
143V
13.5V
I301
I602
I601
I501
JPA02
JPA01
U100
TP2
P903
SC-140 CRT
SCT1
S/N:4059805093-00
DSC-3210E/SC-140

9- Schematic Diagram


I501 VCT38XY
u-com part
V.processor part
I601 MSP3410 Sound decorder
I602 TDA8946J
I901 TDA6107Q
I101 TDA-4470M
I301 TDA8358J Vertical Amp
I801 STR-F6654
I603 KA4558
I702 24C16
SCHEMATIC DIAGRAM (32")
DSC-3210E
NOTE:
1. RESISTANCE IS SHOWN IN OHM. K=1000, M=1000000
2. UNLESS OTHERWISE NOTED IN SCHEMATIC ALL CAPACITOR VALUES ARE EXPRESSED IN uF
3. VOLTAGES READ WITH "VTVM" FROM POINT INDICATED TO CHASSIS GROUND USING A COLOR BAR SIGNAL WITH ALL CONTROLS AT NORMAL LINE 230V AC VOLTAGE READINGS SHOWN ARE NORMAL VALUES AND MAY VARY +20% EXCEPT H.V
4. THIS CIRCUIT DIAGRAM IS A STANDARD ONE CIRCUIT PRINTED MAY BE SUBJECT TO CHANGE FOR PRODUCT IMPROVEMENT WITHOUT PRIOR NOTICE
WARNING:
BEFORE SERVICING THE CHASSIS, READ "X-RAY RADIATION", "SAFETY PRECAUTION", AND "PRODUCT SAFETY NOTICE" IN SERVICE MANUAL
CAUTION TO SERVICE TECHNICIANS:
BEFORE RETURNING THE RECEIVER TO CUSTOMER, LEAKAGE CURRENT OR RESISTANCE MEASUREMENTS SHOULD BE PERFORMED TO DETERMINE THAT EXPOSED PARTS ARE PROPERLY INSULATED FROM THE SUPPLY CIRCUIT.
RESISTOR
CARBON FILM
R M-OXIDE
CARBON COMP
FUSIBLE
CEMENT
CAPACITOR
ELECTRO
CERAMIC
CERAMIC CH
ELECTRO NONPOLAR
MYLAR
COIL
PEAKING
CHOKE
BEAD
* WAVEFORMS
TEST CONDITIONS : PAL-B/G COLOR BAR (NOR.1)
PRODUCT SAFETY NOTE :
THE COMPONENTS MARKED WITH ⚠ ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET AND SHOULD BE REPLACED ONLY WITH TYPES IDENTICAL TO THOSE IN THE ORIGINAL OR SPECIFIED ONE IN THE PART LIST. DON'T DEGRADE THE SAFETY OF THE SET THROUGH IMPROPER SERVICING.

DAEWOO

DAEWOO ELECTRONICS CO., LTD

686, AHYEON-DONG MAPO-GU
SEOUL, KOREA
C.P.O. BOX 8003 SEOUL, KOREA
TELEX : DWELEC K28177-8
CABLE : “DAEWOOELEC”